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# **GREEN SPACES IN URBAN ENVIRONMENTS AS A HUMAN RESTORATION RESOURCE**

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# ABSTRACT

**D**ensification in cities around the world is a trend and the amount of people who is suffering from stress is increasing. It is well known that green environments are good for our health and that they can help to reduce stress. Can smaller green environments, such as pocket parks, have a positive restorative effect on people? In this thesis, different theories are selected and described and then compared and common themes between the theories are identified. Existing research concerning restorative effects of green environments and particularly pocket parks are reviewed and evaluated. The knowledge that is gathered is resulting in recommendations of what to consider and include of the following elements: focal point, deflected vistas, depth, water (visually and sound), patterns and colours, wildness, wildlife (visually and sound), edges/borders, roof, view from a window, wind, paths, people, enclosure, different rooms, seating arrangements, the experience of size and crowding. Finally, the importance of green spaces in urban environments, how the environments we are in effect us and what a designer/planner should think about when designing pocket parks in urban environments is discussed. It is important that we protect smaller green spaces in urban environments as they are an invaluable asset for any city and they should withstand the "exploitation pressure" that is happening due to densification. Everybody needs a close access to some kind of green areas, small or big, so it is important that green areas are seen as a part of the bigger picture of densification.

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# INTRODUCTION

**W**hen I started this thesis I asked myself, why am I studying the master in Landscape Architecture? I have always found nature as an important part in my life. It has always been an environment I prefer spending my time in and it is something that I want to improve in our cities. Urban environments are normally built on a grid system and nature has normally softer lines that are "flowing". The grid system of an urban environment, helps people to have a fast speed. There are straight lines, ninety degrees corners and a lot of people and traffic. I think that urban environments without any greenery gives the visitor quite a hard impression while urban environments with greenery gives a lot softer and calmer impression. A good example of this, of an urban environment with a lot of greenery, is a place in the capital of Sweden, Stockholm, called Gärdet. Here there is a lot of greenery between the houses (see figure 1 & 2). People living there have a green view from their windows, it brings everything down to human scale and I think one almost forgets that one is in a big busy city while walking there. For me an ideal city is a city with lots of smaller green areas, that are well integrated with the city and with the bigger green areas in the city. I think this can be achieved with help of green pocket parks and Thwaites et al. (2005) explain it well: *"...mosaics of linked spaces woven into the urban fabric"*.

I think that green environments are very important for our health, both physical and mental. We are experiencing more and more pressure from our society and many people are as well experiencing more pressure from their workplace. This leads to higher stress levels which in turn leads to people seeking relief through outdoor recreation and activities (Hartig, et al., 2003).

It has also been shown that high density in residential areas has a negative effect on the people living there. The health gets poorer, the intensity of aggression gets higher as well as crimes, and people are less social (Aiello & Thompson, 1980).

Densification does most commonly lead to less open spaces and less green spaces within an urban environment and it is therefore very important to find different ways to create green outdoor environments and opportunities for restoration within our urban environments that are easily accessible for the inhabitants (Thwaites et al., 2005).



*Figure 1. Gärdet in Stockholm.  
Photo: Google Maps*



*Figure 2. Gärdet in Stockholm  
Photo: Henrik Ahlen*

# AIM AND RESEARCH QUESTIONS

**M**y aim with this thesis is to, through a literature study, look deeper into how pocket parks can play an important part in giving people a place for restoration that is close to home. I will, through the literature study, make a review of theories that are relevant for restoration and of what elements (e.g., open areas, inclosed areas, sounds, lots of greenery, less greenery, water) in a smaller urban park that have restorative effects on humans.

I will, with the knowledge I gain from the literature study, create general guidelines for which elements that should be used because they are important for restoration. I will show these different elements through text, conceptual sketches and inspirational photos.

My other aim with this thesis is to give myself greater knowledge about what elements that are important in a smaller green area in a city for it to be restorative and what theories, besides the most cited theories (Attention Restoration Theory and the Stress Recovery Theory) that are relevant for restoration.

I do as well hope that this thesis will spread the knowledge and that this will inspire landscape architect's/city planner's to work more with pocket parks in the urban environment.

Questions I want to answer in this thesis are:

Can small green spaces provide health benefits at a similar degree as other green areas have shown to do?

What elements does a pocket park need to include and how should it be designed for it to provide likelihood for restoration?

Will the amount of people who use the park be a problem for the restorative qualities?

# METHOD

I have reached my objectives through a literature study. I chose theories that I thought were relevant for this subject and I summarized them where I compared them and identified common themes. Existing research regarding restorative effects of green environments, especially pocket parks has been reviewed and evaluated. I have then, based on my summary of the theories and my review of the existing research, created guidelines and recommendations of tangible elements that would work in a pocket park based on the limitation of size and context. The result is then evaluated and discussed.

Databases I have used to search for literature are Scopus, Web of Science, PubMed and Google Scholar. Keywords I used in the databases were, restorative environment, urban parks, pocket parks, soundscapes, Attention Restoration Theory, Stress Recovery Theory, Prospect and Refuge, Arousal theory, Territoriality, Personal space and blue space. My supervisor recommended authors to me that I searched for in the databases. She did as well pass me some articles that she thought could be useful for me. Some of the references I have used were cited in articles I read that I thought were interesting, that were in the same topic and that I thought could be useful for this thesis. I did as well find books that I borrowed from the library at the university when I was searching for references in the databases.



# STRESS IN URBAN ENVIRONMENTS

## STRESS IN MODERN SOCIETY

In Sweden during the mid 1990's stress related illnesses such as burn-outs, stress related pain, depression and mental fatigue reached unreasonably high levels (Grahm et al., 2010). The amount of people suffering from stress in Sweden has more than doubled the last ten years (Kramsjö, 2018). Stress related illnesses, such as stress caused by changes in one's life circumstances, traumatic life events, post-traumatic stress disorder and burnout syndrome, where the two latter have a highly negative effect on one's ability to work, are the most common illnesses in Sweden today. These type of illnesses increased by 119% between year 2010-2015, from 31 000 to 68 000 people (The Swedish Social Insurance Agency, 2016). Today (2018/2019) 18% of the total population in Sweden is suffering from stress (age 16-84). The percentage higher amongst the younger population where it is as high as 35% among young women (age 16-29) and 18% amongst men in the same age group. These numbers has increased with 6% between year 2016-2018 and the percentage of stressed individuals amongst students has increased from 22% to 31% during the same period (Public Health Authority, 2019). It is not just in Sweden mental health disorders are increasing. In 2004 mental health disorders had reached an unreasonably high level around the world, a level of 13%, and depression alone accounted for 4.3% (WHO, 2013).

Mental health disorders can have many different causes. Something that increases stress and mental fatigue is the use of directed attention. Directed attention is a mental resource we human use when we for example are paying attention, staying focused and solving problems which requires a lot of effort. Directed attention is a resource that is limited and it needs to rest so it won't be "over used" (Kaplan & Kaplan, 1989). The amount of people who has jobs with more attention demands are today increasing and we tend to use our directed attention more than we used to. One could say that we overuse it, and it becomes more and more important to restore such a crucial resource. Mental fatigue can as well be caused by the environment one is in, one's external circumstances or from one's personal experiences or from both. Many people suffer from stress that is due to their occupation and that could be because one feels stressed due to too much responsibility and the lack of resources to take care of it. Other

things that can affect one's stress level is the work load (that there is too much work and not enough time), one's lack of confidence (one doesn't feel like one can do as good a job as possible) and one can feel stress due to one's high expectation to perform at work (your own expectations and expectations from coworkers). Something else that can affect our stress level is that one might have high expectation to "perform" at home with one's family. Other reasons for stress could be life events that are out of one's control, such as going through the loss of a loved one, losing a job, living with stressors from the city (e.g. densification, pollution, noise, traffic), going through a terminal illness or adjusting to a new culture in a new country. Psychological stress is an outcome that happens when a human's resources are being too heavily used, which in turn leads to that there is no adaptive and/or automatic response left (Lazarus & Cohen, 1977).

When suffering from stress one can get consequences such as, one's level on skill performances gets lower, one would feel that one's perception gets disturbed, that it is harder to work with a specific task, one can have memory problems, one's personality can change, one can get anxiety and one can have problems reading and answering questions (Lazarus & Cohen, 1977). One can also struggle with taking in information and one is more likely to make mistakes (Kaplan et al., 1998).

Natural environments such as gardens, lakefronts and parks, can help to reduce stress. It lets the directed attention rest (Kaplan & Kaplan, 1989) and it can help people restore their mental health (Nordh, et al., 2009). People will go through a restorative experience when letting the directed attention rest. Restorative experiences can for example make it easier to work with tasks that needs one's full concentration and one's head will feel clearer (Kaplan et al., 1998). A restorative experience can be achieved by spending time in environments one finds pleasurable (Kaplan & Kaplan, 1989).

There are according to Wohlwill (1970) three different relationships between our behaviour as humans and the environment.

The first relationship is that the context of an environment can limit some specific behaviours or behaviour patterns that can happen within it. The second relationship is that qualities in environments, that characterize the environment, affect the people living in them, both their personality and their behaviour. The third relationship is where the environment works as an motivator that can affect one's feelings, one's attitude, one's behaviour when approaching, adapting or avoiding.

## ATTENTIONAL DEMANDS IN URBAN ENVIRONMENTS

**M**ore and more people are moving into cities today (Bratman, et al., 2015) and urban environments are not the best environments to restore directed attention. In urban environments one has to constantly be aware of what is happening around you (e.g., ignoring sounds, avoiding traffic, ignoring advertising) which requires a lot of directed attention (Kaplan & Berman, 2010). When living in crowded urban settings our senses get constant information (Lazarus & Cohen, 1977) and these urban environments, that are chaotic, overwhelm our brain and our ability to decide what information is relevant for us (Kaplan et al., 1998). To be able to cope with that, people seem to get more and more isolated from other people. People "turn off", they are not always aware of what is happening next to them and they disengage to protect themselves from too much stimulation/information (Lazarus & Cohen, 1977). There is according to Stokols (1972 see Küller 1991) a difference between density and crowding where density represents the physical circumstances and crowding is the experience one has in such conditions.

## THE IMPORTANCE OF NEARBY GREENERY

**I**n cities today, densification is a trend (Nordh, 2011) and the cities keep expanding which leads to that the natural green environments are getting further and further away from the city centers. So the importance of smaller green areas, such as rooftop gardens, streets with trees and pocket parks, are increasing (Thwaites et al., 2005). The European Commission (2003) recommends that people should have a public open area, such as public parks, gardens and open spaces, within 300 m from their homes. There has been research made that indicates that a park will be more visited if it close to home (Nielsen & Hansen, 2006) and that smaller parks that are close to home are highly valued (Burgess et al., 1988). Kaplan and Kaplan (1989) claim that people prefer being in natural environments. That being in natural environments is more effortless than being in urban settings even though the urban setting was something they were more used to. They as well found out, through interviews, that people function better in the natural environment and that the natural environment was (in one of the interviewee's own words) a "life-saving concern".

A plot in a city today is getting more and more expensive. The more expensive it gets the more interesting it is for exploitation. We need to take care of and protect the green environments we have, we need to make new ones as an addition to the existing ones and importantly, make them as attractive as possible so that they can withstand the "exploitation pressure".

The restorative effect green environments have on us humans is quite well known. One can today find different theories that argue for how green environments affect human well-being positively and why and how they affect us. I will in the next part bring up some theories that I find relevant to this subject.

# THEORIES RELEVANT TO NATURE AND HEALTH/STRESS

I will in this part explain some theories that are relevant to nature and health/stress. The theories I am describing are: Attention Restoration Theory (ART), Stress Recovery Theory (SRT), Prospect and Refuge Theory, Arousal theory, Territoriality, Personal space, Human-Environment Interaction, and Perceived Sensory Dimensions (PSD). I chose to read about Personal space, Territoriality and Prospect and Refuge due to the densification that is happening in our cities. To get an understanding on how humans react to interaction with other humans and how we react to space. I chose to read about ART, SRT, Arousal theory, Human-Environment Interaction and again Prospect and Refuge to get an understanding on how humans react to their environment and how an environment can affect us, positively and negatively. I chose PSD to see and get an understanding on how some of the theories has been used earlier.

## ATTENTION RESTORATION THEORY

Attention Restoration Theory (ART) is a theory that is developed by Stephen and Rachel Kaplan (1989) and it focuses on cognitive processes (Kaplan, 1995). It is a theory on how humans process information and different impressions. ART is built on a theory by William James (1892) and there is, according to James, two different types of attentions, involuntary attention and voluntary attention. Involuntary attention refers to an attention that doesn't require any effort, for example when something interesting is happening or something is exciting. Kaplan and Kaplan (1989) calls this attention fascination. Voluntary attention refers to an attention that is used when we need to focus on for example a complex problem, when we stop unwanted information, for example noise and things that require a lot of effort. Kaplan and Kaplan (1989) calls this directed attention. This attention is a limited resource and it becomes drained when we use it too intensively and/or for too long and this will lead to mental fatigue or in other words, a fatigued directed attention (Kaplan & Kaplan, 1989; Kaplan & Berman, 2010). A person that is fatigued can be irritable (especially in environments that are crowded such as urban environments), the person can be more aggressive, having difficulties to concentrate, be less tolerant and the person is less likely to help another person that is in need of help (Kaplan & Kaplan, 1989).



To give the directed attention a chance to rest we have to use involuntary attention, fascination. We use this attention when we for example explore natural environments such as a forest. While doing this, we don't have to take any complicated decisions, we don't have to prioritize or sort information, we get fascinated by the environment and this means that the directed attention is able to rest. The more natural the environment is the better it is (Kaplan & Kaplan, 1989; Kaplan, 2001b; Kaplan, 1995).

Environments that allow for restoration of the directed attention are for instance natural areas with vegetation, and this type of environment most likely contains the four components that support restoration according to ART, being away, extent, fascination and compatibility.

***Being away*** refers to psychological distance from the everyday life. For example, from one's demands at work and routines which use some of the capacity of the directed attention (Kaplan & Kaplan, 1989).

***Extent*** refers to the next step of 'being away' which is having the capacity of experiencing 'being away' and exploring the environment and the feeling. "Being in a whole other world" (Kaplan & Kaplan, 1989, p. 184) is often used to describe extent and it refers to both perceptual and physical. It refers to an extension of space and time. There should be a feeling of that there is more to see, that one can keep going (Kaplan et al., 1998).

***Fascination*** refers to people being curious. The mind gets captured by the environment in an effortless way, one is being fascinated. When being fascinated one uses the involuntary attention and this plays an important part during the restorative experience. Kaplan and Kaplan (1989) call it soft fascination when our minds get captured by nature. When we for example can see different patterns that have been created by shadows or when light comes through foliage, how nature goes through changes through the seasons and weathers and this linked with aesthetics, captures our interest and our mind will be allowed to drift away. Hard fascination is something that Kaplan (1995) refers to when we for example are watching TV or a game of sport, something that requires our full attention.

***Compatibility*** refers to when the environment offers and provides what one needs during that time. That could for example be, a place to relax or a place to socialize (Kaplan & Kaplan, 1989).

People experience some benefits when being in nature and these benefits are, according to Kaplan and Kaplan (1989) related to three aesthetic factors.

The first factor is that aesthetic natural environments are fulfilling to experience and that they give pleasure. The second factor is that aesthetic natural environments allow people to explore and to move around with confidence and with comfort. This kind of environment supports the rehabilitation of the directed attention. The third factor is divided into four different levels, four levels that one goes through when recovering from mental fatigue. They are linked together and for each level to be achieved they all require restorative environments that have quality that gets successively higher and that the time spent in the environment needs as well to be successively longer.

In level one, one "clears its head" from leftover clutter that could be in the way from one's ability to do tasks and to understand requirements of new tasks. In level two one will recharge the capacity of directed attention. In level three one gets to face cognitive residue that might be in one's mind from past days, months or years. It is important to face them so that they won't create clutter in one's mind. The last level, the fourth level, is the most challenging one. Here one will start reflecting "on one's life, on one's priorities and possibilities, on one's actions and one's goals" (Kaplan & Kaplan, 1989, pp. 196-197).

## **STRESS RECOVERY THEORY/ THE PSYCHO-EVOLUTIONARY THEORY**

**S**tress Recovery Theory (SRT) is a theory by Roger Ulrich (1983) that is biologically and evolutionary based. According to SRT, humans react positively to natural scenes that are unthreatening compared to urban scenes. A person that is stressed and experiencing high arousal (activation) will through a natural view reduce his/hers arousal, experience positive emotions and will go through a restorative experience and a better recovery (Ulrich, 1983; Ulrich et al. 1991). Participants in a study recovered from stress much better, faster and more profoundly when they were exposed to savannah-like (see further down in text for explanation) natural environment with a water feature that was easily seen (Ulrich, 1993).

Ulrich explains that humans go through three stages when interacting with an environment. (1) first we get a feeling, for example of feeling safe, (2) then we have our rational understanding/thoughts to our feeling and after that (3) we behave according to our understanding/thoughts, we stay or we flee (Ulrich, 1983;1993).

For a natural environment to lower our arousal and for it to give people what they prefer and find it more restorative it needs to contain some specific qualities according to SRT. Ulrich argues that the following qualities elicit restoration more effectively (Ulrich, 1983;1993):

**Complexity** refers to the amount of different elements there are within a scene and the preferred level is moderate to high. The different elements could be for example patterns, textures and objects, however they should not be too overwhelming for the visitor (Ulrich, 1983).

**Structural properties** refers to patterns, structures and orders that make the complexity readable for the visitor (Ulrich, 1983).

**Focality** refers to giving people a focal point, something that will attract the viewer. That could for example be a feature that stands out. Focality can be used in environments with very low to very high complexity compared to other structures (Ulrich, 1983).

**Depth** refers to giving the visitor moderate to high level of visual depth, a view and a feeling of openness and space (Ulrich, 1983).

**Ground surface texture** refers to helping the visitor to read the environment and see possible flight options if that is necessary (Ulrich, 1983).

**Threat/tension** refers to an environment where threat is absent or negligible. The threats could for example be environmental threats such as weather conditions or a threatening person. Ulrich mentions that environments containing calm water had lowest tension and were being preferred (Ulrich, 1983) .

**Deflected vistas** refer to sight lines such as paths, streams etc. being curved and partly hidden which will give the visitor mystery and curiosity (Ulrich, 1983).

**Water** refers to that environments containing water are more preferred and they are seen as pleasant, peaceful, they give a positive feeling and water elicits a response that is quicker and affective (Ulrich, 1983). Humans preference of water connects to our evolution, that we cannot survive without water. Water that is calm or slow-moving is preferred (Ulrich, 1993).

**Savannah-like** refers to the hypothesis that humans still genetically have a preference for natural environments that have savannah-like/ park-like properties and that they are seen as peaceful. These properties can be scattered trees or smaller groupings of trees on a uniform lawn/grass area, a landscape that is spatially open (Ulrich, 1993).

**Flowers** refers to our human evolution, that flowers are a sign of food so they give us a positive effect and we prefer them (Ulrich, 1993).

**Unthreatening wildlife** refers to smaller animals such as birds and insects that will enhance the positive feeling of an environment (Ulrich, 1993).

# PROSPECT AND REFUGE THEORY

**P**rospect and Refuge Theory is a theory by Jay Appleton (1919-2015). Humans prefer, according to Appleton (1975), to be in environments that are high in prospect and refuge because that kind of environment gives people places to hide if necessary and a chance to observe what is happening around them, "to see without being seen". Environments that offer this, the feeling of being safe, are the kind of environment where one will be able to relax and restore one's attention. Prospect is what Appleton refers to when there is an opportunity to see, and refuge is what Appleton refers to when there is an opportunity to hide. Appleton does as well talk about something he calls "secondary prospect" or "indirect prospect". Appleton refers to views that are limited when he talks about that. One sees a "secondary prospect", one goes there (for example up a hill) and on the hill one will have "direct prospect", a view with no obstacles.

Appleton (1975) argues that humans prefer these kinds of environment because of their past. That our ancestors had to survive and try to find places that were suitable to settle down in. Places that offered prospect, a view of the surrounding and potential dangers, and refuge, possible places to hide from the potential dangers.

There needs to be a balance between prospect and refuge in an environment for it to be optimal. If there is an imbalance between the two, the environment will become unsettling and cause more stress (Gatersleben & Andrews, 2013). What is then a good balance between prospect and refuge?

There are different studies that test the Prospect and Refuge Theory and Petherick (2000) found out during his research that too much refuge would lead to that people did not feel safe. Too much refuge means that there are too many hiding places for an offender to hide. The participants in Petherick's research said that they felt unsafe if there was too much trees and bushes that provided hiding places or there was not enough lighting. There should be more prospect for the visitor and less refuge for potential offenders to hide for the visitor to feel safe in a setting. In other words, an area with low prospect and high refuge is considered as unsafe and an area with high prospect and low refuge is considered as safe.

In 2013 Gatersleben and Andrews did two studies where they tested what role prospect and refuge plays in an environment to make it restorative. Their first study was a study where they had participants evaluating if a natural environment with high prospect and low refuge

was seen as less dangerous and evoked less fear compared to environments with low prospect and high refuge. They also examined whether prospect and refuge had an effect on how an individual perceived an environment and if it was restorative or not. The participants looked at 124 photographs and they were asked to put the photos in three different piles. The piles being (1) the prospect was high, (2) if it was accessible and (3) the refuge was high.

In the second study they examined if people will recover faster from stress and fatigue if they are exposed to natural environments that are high in prospect and low in refuge compared to people who are being exposed to natural environments that are low in prospect and high in refuge. There were two groups of participants, one who did a walk through a natural environment with low prospect and high refuge and another walk through a natural environment with high prospect and low refuge. The other group watched a video of the same walks in a lab. All participants did a fatigue task before the walks and before they watched the video to make sure they were in a state of mind where they needed restoration.

The results from the first study was that natural environments that are accessible and high in prospect and low in refuge were perceived by the participants as more restorative because it was seen as evoking less fear and less dangerous compared to the environments that were not accessible and were low in prospect and high in refuge. In other words, an environment that is enclosed (high refuge) can make the visitor feel unsafe.

The results from the second study demonstrates that a walk through a natural environment that is accessible and high in prospect and low in refuge is more restorative compared to a walk through a natural environment that is low in prospect and high in refuge. They did see as well that the walk that was high in prospect and low in refuge increased the participants ability to concentrate whereas the walk with low prospect and high refuge had the opposite effect and made their ability to concentrate worse. The improvements of the ability to concentrate were significantly better for the people who did the actual walk whereas the participants in the lab did not get the same improvements.

# THE EIGHT EXPERIENCED NATURE DIMENSIONS/PERCEIVED SENSORY DIMENSIONS

**G**rahn, Stigsdotter and Berggren Bärning developed eight different park characteristics in 2005 that they called The Eight Experienced Nature Dimensions (Grahn et al., 2010). These characteristics were developed with relation for instance to SRT, ART, Prospect and Refuge and biophilia hypotheses (Grahn & Stigsdotter, 2010), and Grahn et al. (2010) argue that these different dimensions are fundamental blocks for the design of gardens and parks and that some are more important than others. The Eight Experienced Nature Dimensions was later on developed further by Grahn and Stigsdotter (2010) based on people's preference of nature qualities and it was renamed Perceived Sensory Dimensions (PSD, see text box 1). The eight different PSDs are 'nature', 'serene', 'space', 'refuge', 'prospect', 'culture', 'social' and 'rich in species'. These were developed to be used as a tool when designing a garden or a park (Grahn et al., 2010).

## **The Eight Experienced Nature Dimensions/ Perceived Sensory Dimensions (PSD)**(Grahn et al., 2010, p. 123; Grahn & Stigsdotter, 2010)

**Serene** - Peace, silence and signs of care. Sounds of wind, water, birds and insects. No rubbish, no weeds, no disturbing people, safe and secure. In its most distinct form, this can be described as having the character of a restful church interior.

**Nature** - Fascination with wild nature. Plants seem self-sown. Lichen- and moss-grown rocks, old paths. Something created not by humans, but the power of something mightier.

**Rich in species** - A room offering a variety of species of animals and plants

**Space** - A room offering a restful feeling of 'entering another world'. A coherent whole, like beech forest.

**Prospect** - A green, open place with room for vistas and a place that invites you to stay.

**Refuge** - A sanctuary, an enclosed, safe, secret and secluded place, where you can relax and be yourself and also experiment and play.

**Social** - A meeting place for festivity and pleasure. A social arena or meeting place.

**Culture** - A place offering fascination through evidence of people's values, beliefs, efforts and toils, and perhaps with the passage of time.

# AROUSAL THEORY

**A**rousal theory is a theory that is developed by Daniel Berlyne (1924 - 1976). It is a theory on characteristics of physical stimuli that increase the aesthetic experience and on aesthetic pleasures. People, according to this theory, need to, through stimuli, reach a good level of arousal and maintain it. To reach a good level of arousal one has to have stimuli that help reach that level. Such stimuli can be a mixture of characteristics that increase the arousal and characteristics that decrease the arousal. Examples of characteristics that increase the arousal level are ambiguity/uncertainty, complexity and novelty and some examples of characteristics that decrease the arousal level are patterns and familiarity. These kinds of stimuli are preferred because they can give one an arousal level that is pleasurable, they can help to keep the arousal level on a good level or they can help to take down the arousal level to a good level if it gets too high (Berlyne, 1960).

We humans need environments that can provide a certain flow of information, stimulation and challenges to our central nervous system for it to work at its best. It should not be overloaded or overstressed and research has shown that an extended exposure to an unstimulating or overly monotonous environment has a damaging effect on different psychological functions (Bexton, Heron & Scott, 1954; Kubzanski, 1961, see Berlyne, 1966). How much information, stimuli and challenges is optimal can vary depending on one's psychophysiological state, culture, personality and one's experiences through life, recent ones and earlier ones (Berlyne, 1966).

When someone is aroused it can be seen and noticed throughout the body. One's arousal level can be measured accurately through the brain activity, blood circulation, muscular tension, the diameter of one's pupil, temperature of the skin and respiratory system (Berlyne, 1966).

Berlyne (1966) did with some of his associates in 1965 an experiment with rats. Some of the rats were kept in a room that were constantly noisy and some were kept in a room that was quite. They found that the rats that were kept in a noisy room had a higher arousal level and they preferred a familiar stimulus compared to the rats who were kept in the silent room, who had a lower arousal level and preferred new stimuli. They learned that the arousal level raises more with new stimuli and what is preferred depends on the subject's arousal level from the beginning.



Berlyne (1966) also found during earlier experiments that rats and humans that have an arousal level that is exceptionally high due to different factors (e.g. hunger, fear, pain, noise) are less likely to seek complex or new stimuli. He did as well find that our behaviour is not only influenced by emotional disruption, lack of substances that are vital and irritations, but also by conflicts that can be going on between different processes that can occur in our central nervous system.

## TERRITORIALITY

**T**erritoriality is something that can be found in everyday life (Sack, 2001). Brower (1980, pp. 179) explains it like this:

*"It referred particularly to the act of laying claim to a geographic area, marking it for identification, and defending it when necessary against others of the same kind."*

Territoriality among animals is more of an instinct than it is with us humans and this instinct often occurs with aggression (Sack, 2001). Human's territoriality is more varied, it is not so predictable and it is less consistent and this is because our behaviour as humans has been modified through cultures and we use it more and more to achieve symbolic purposes/intentions (Brower, 1980). Territoriality is something we can find in our everyday life. It is something that we can turn on and off and use when we for example want to create a new territory, "take over" a preexisting one, control, affect or influence people or relationships. In other words, territoriality includes control, classification and communication. We rely on existing spatial interactions when we don't use territoriality (Sack, 2001).

There are different levels of territory, different levels of intimacy and privacy. For example, there is a high level of intimacy and privacy in a bedroom compared to a pop concert where the intimacy and privacy is low. We can for example use territoriality when it comes to personal space. We use this mechanism to create a space between us and another person that we think is comfortable and what is comfortable depends on one's cultural background and the type of relationship we have with the other person. Territoriality is normally connected to a specific location and personal space is not (Brower, 1980).

The understanding of how territoriality works can be useful for urban designers and city planners. It can give them an understanding of the relationship between the actions and attitudes of the people using the area. With such an understanding they can get the parks/public areas



more used and appropriated by the inhabitants. For example, in 1974 Brower and Williamson did a study of a few smaller parks in the inner city of Baltimore. The parks were planned by the city to function as recreational areas for the people living in the area. The city did not have much money so they were hoping that the residents in the area would appropriate the parks and help with taking care of them. The areas where the parks were located were quite violent and there were a lot of crimes so the residents did not feel safe and did not feel comfortable enough to get an territorial approach towards the parks. The residents saw the parks as property that was belonging to the city and when the management and maintenance failed people stopped using the parks. The parks became "a no-man's-land". They became a place where people threw their garbage and groups that were antisocial used it as a place where they could hang out.

A place needs to give people a feel of identification for them to feel attached and for them to appropriate it. If people get the feeling of identification, they are more likely to appropriate the place and that kind of territory will more likely be taken care of and protected (Brower, 1980). Territories that are public such as parks, are not owned by a specific person and they are therefore quite hard to control. The occupancy of the area is normally quite short and the personalization is limited (Costa, 2012). For Brower's (1980) summary on territorial behaviour, see text box 2.

**Brower's summary about the nature in territorial behaviour (1980, p. 193):**

1. *The effect of territorial behavior is to mitigate the threat (real or imagined) of unregulated interaction. The greater the threat, the stronger will be the tendency toward territorial behavior, and the more important it will be to satisfy criteria for the design of defensible space.*
2. *A culture or life-style that relies heavily upon nonspatial rules and customs to regulate social interactions will depend that much less upon territorial behavior.*
3. *There are three territorial strategies for dealing with increased threat: increase the defense of existing territorial claims; narrow the field by shifting or shrinking territorial boundaries to a more defensible position; renounce one's territorial claims.*
4. *Territorial behavior has direct implications for land management, because it insures that parcels of land are divided among many individuals and groups who accept responsibility for their maintenance.*
5. *The ability to establish a territorial claim will be affected by the ability of the prospective occupant (individual or group) to establish an appropriate type of occupancy.*
6. *Occupancy is usually accompanied by a display of territorial signs that announce the existence, nature, and extent of the claim. Weak territorial signs do not necessarily mean, however, that a space has not been appropriated.*
7. *A place where potential occupants have a strong sense of identification is most likely to be appropriated, and, once appropriated, is likely to be defended most tenaciously against challenge.*
8. *A strong sense of attachment is not only a cause, but is frequently a consequence, of the act of appropriation.*
9. *Improvements in site design that make a space more defensible will increase the likelihood of appropriation to the extent that suitable occupancy conditions exist, and that occupants have a feeling of attachment for the place.*

Text box 2

# PERSONAL SPACE

**R**esearch shows that humans need space of their own, personal space, and that we can get stressed if we are in an area that is too dense and crowded. To make sure this does not happen space gets divided between people (personal space), and this can also be seen as territoriality (Küller, 1991).

Personal space is a zone around our bodies that we feel like is "our own space" and this zone varies depending on culture, one's internal state, age and context. Personal space can be described in different ways and some words that are commonly used to describe it is: 'an aura around the body', 'a bubble' and 'a snail shell' (Sommer & Iachini, 2017).

One can say that personal space has two main functions. Firstly, it controls and manages the quality and the amount of "sensory stimulation" which means that it protects us from encounters that might be uncomfortable, both physically and psychologically, and secondly, it tells the other person or persons during interaction what the preferred distance is to stay on during the interaction (Aiello & Thompson, 1980).

There are, according to Hall (1966), four different levels in the social life of humans. The four different distances are intimate distance, personal distance, social distance and public distance. Each distance has two different zone spans, "close phase" and "far phase".

***Intimate distance*** zone span is 0-46 cm. The "close phase" within in the distance is 0-15 cm and the "far phase" is 15-46 cm.

As one can understand from the name, this distance is when a human is very close to another human. One's body can very easily touch another body, one can easily smell the other person, one can easily feel the heat of the other person and therefore most likely get a feeling of the other person's arousal level. One can see details of the other person's skin, muscles movements and eyes. One can as well hear sounds from the other person that normally one won't hear, such as breathing and whispering. Communication at this distance is rich both in the "close phase" and the "far phase". (See text box 3 for Hall's description of this distance)

**Personal distance** zone span is 46-120 cm. The "close phase" within in the distance is 0-80 cm and the "far phase" is 80-120 cm.

Hall (1966) calls this zone "transition zone" where people can choose to be more intimate or more formal. In the "close phase" one can touch another person without any difficulties and one can shake hands with another person in the "far phase", as Hall calls it, "keeping someone at arm's length". This zone is the normal one humans use when communicating with each other in public. Communication in this zone is easy. Tension and discomfort can be felt if one comes too close to the other person, towards the intimate zone. (See text box 4 for Hall's description of this distance.)

Hall's description of the intimate distance (1966, p.110):

*"At intimate distance the presence of the other person is unmistakable and may at times be overwhelming because of the greatly stepped up sensory inputs. Sight (often distorted), sound, heat from the other person's body, smell, and feel of the breath all combine to signal unmistakable involvement with another body."*

Hall does also say (1966, p. 111):

*"...the use of intimate distance in public is not considered proper by adult, middle class Americans."*

Text box 3

Hall's description of the personal distance (1966, p.112):

*"The term originally used by Hedinger to designate the distance consistently separating the members of non contact species. It might be thought of as a small protective sphere or bubble that an organism maintain between itself and others."*

Text box 4

**Social distance** zone span is 1.2-3.7 m. The "close phase" within in the distance is 1.2-2.1 m and the "far phase" is 2.1-3.7 m.

This distance is for example commonly seen at social events and in work environments. It is i this distance hard for people to touch each other. If one is in the middle of this distance one can see another person's body and face quite clearly, one can see how another person is moving their body and how their posture is. Communications in this distance is done in a "normal" voice level but will get louder if one speaks in the "far phase" and communication will be a lot harder outside this distance. This distance is normally used when people would like to be in contact with another person but without being too intimate.

**Public distance** zone span is from 3.7 m and up. The "close phase" within in the distance is 3.7-7.6 m and the "far phase" is from 7.6 m and up.

This distance is a formal distance and it is commonly seen at public occasions. It is for example a distance that is commonly to have between a speaker during a public occasion and the first row of the audience. One can visually get an impression of a person in this zone, and one can as well see big gestures. Skin texture, eye colour or other fine details of a person are not noticeable at this distance. Communication gets harder in this zone and phrasings and pronunciations gets easily formal and expressions can get overstated for people to understand one and people have to work quite hard for a communication to remain.

Altman and Vinsel (1977) saw during their research that people interacted at different distances depending on if they were standing up or sitting down. While seated the participants interacted especially in the close phase in the social distance but as well in the far phase of the personal distance, and when standing the participants mostly interacted in the far phase of the intimate distance and the close phase of the personal distance. They saw as well that people used closer distances if they knew each other and if they were interacting with people that were similar in status, age, and sex compared to if they were interacting with strangers. If the environment was more formal the participants sat or stood further apart from each other even if they had a relationship with the other person. During their research they saw as well that people with good confidence, people that recently had a success or similar used less space and stayed closer to others compared to people with less confidence. For people to be able to use the different distances in our personal space, environments that have multiple purposes are required so that the spatial behaviour can shift when needed (Aiello & Thompson, 1989).

# HUMAN-ENVIRONMENT INTERACTION

**A**ccording to Küller (1991) an emotion is a process that develops in different stages. He calls this a basic emotional process and he explains it as such that this process is how we experience an environment. We analyze the environment through these different stages: arousal/activation, attention/orientation, reward/aversion and coping/control. Every impulse we get (from ourselves or from the surrounding environment) gives us our first reaction and that is arousal/activation. After that we often get a reaction of attention/orientation followed by reward/aversion. This process repeats itself over and over again with our relationship to the environment and some basic emotional processes are perhaps only a short event while some happen over a longer period of time, hours to years.

The basic emotional process gets influenced by the person's activities and resources and by the social and the physical environment. We try to adapt when this process is disrupted and our goal as humans is to have control. What activates us (activation/arousal) from the environment should match our resources and should not be more or less. For example, a person can get overwhelmed and loose control over a situation if the activation is too intense. An individual's available resources during a specific event affect how that individual's basic emotional process will work during that event and how that individual perceives the environment. The individual will try and adapt, and try to get control.

Küller (1991) did a model that shows the interaction humans have with the environment that can affect the basic emotional process and what is affected by the process (see Figure 3). This model illustrates how the process works and how everything is connected. When changes happen in the resources, changes occur in the balance between the resources, and the individual needs to change one or more of the resources to restore the balance.

There are according to Küller three different resources that one should take in consideration when planning an outdoor environment. The three resources are social, medical and psychological and they together decide how an individual perceives an environment and how satisfying an environment is.

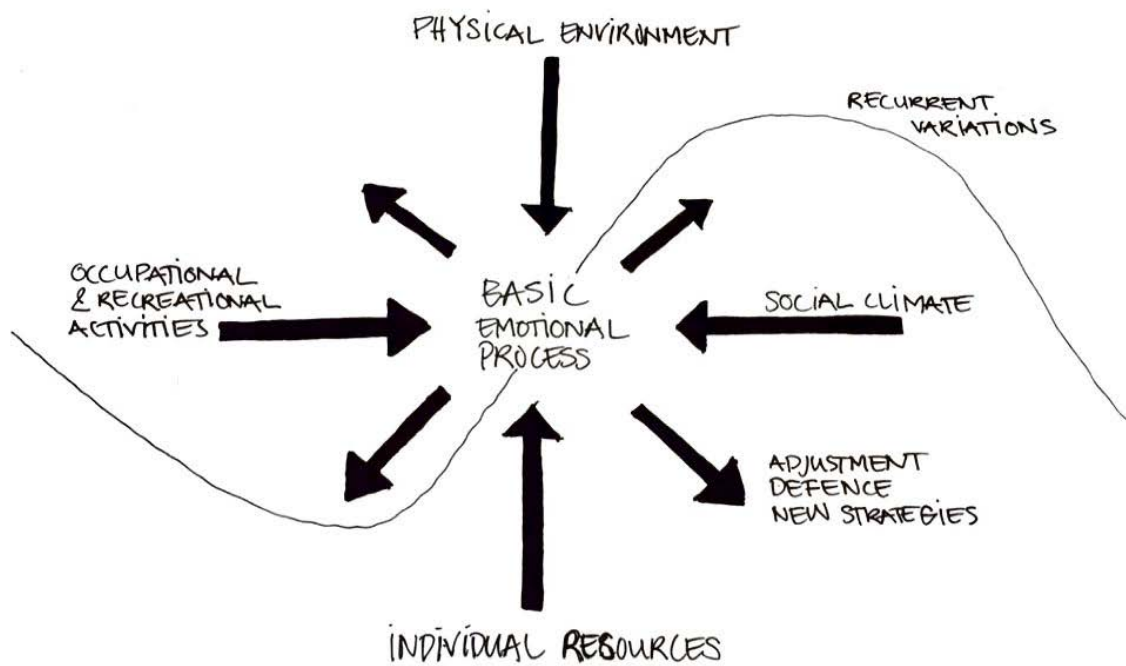


Figure 3. A model of Human-Environment Interaction showing various factors that affect and are affected by the basic emotional process.

Photo: © Anna Bärger after (Küller, 1991, p. 124)

# SUMMARY OF THEORIES

**M**ost of these different theories can in some way be connected to each other. ART, SRT, Arousal theory and Prospect and Refuge theory all to some extent connect to human evolution. They connect the way we react and our adaptation to the environment to our evolution. For instance, Appleton (1975) argues that the environments we prefer are environments that our ancestors felt safe in, environments where they could see the surroundings and potential dangers and hide from the potential dangers. Similarly with Ulrich (1983) arguments, that humans prefer savannah-like environments because our ancestors came from that kind of environment.

The world and the society we live in today has gone through a faster evolution compared to us humans. Our brains have not yet adapted to all the information we constantly get, we don't get a break from it, which results in that we can get stressed and fatigued. ART, SRT, Arousal theory, Prospect and Refuge theory and Human-Environment Interaction all suggest that how an individual is feeling, mentally and physically, affects the way that an individual will perceive the environment and that the environment one is in has an effect on us, positively and negatively. ART, SRT and Prospect and Refuge theory argue that nature has a positive effect on our health and that it is important for us to have nature around us. ART and SRT emphasize that natural environments can support the recovery from stress and cognitive fatigue.

Arousal theory is not a theory specific for green environments but I think that the theory is relevant for this subject. Arousal theory talks about the importance of a balance between old and new, a balance between ambiguity/uncertainty, complexity, novelty, familiarity and patterns. These characteristics are found in nature as well as the urban environment and they can be connected to ART's components and SRT's qualities. To achieve restoration one needs to have a good balance on one's arousal level. Berlyne (1966) found from his research that people with high arousal level prefer familiar stimuli compared to people with low arousal level who prefer new stimuli. This I think can be connected to a stressed human. A person who is stressed has an arousal level that is high and will therefore prefer an environment that is familiar and that feels safe. This I think is important to take into account when planning and designing a park where one activity should be restoration.

The different components in ART (being away, extent, fascination and compatibility) can be used as a guideline of what to achieve when designing/planning a pocket park. How the environment should interact



with an individual. The SRTs different qualities can as well be used as guidelines. These can help with what elements one can use in the design of the park to elicit restoration. These components and qualities are not specifically made for pocket parks but for bigger natural areas. I do think however that they are good guidelines for smaller areas as well. One might not, for example, be able to have all the qualities from SRT in a smaller park due to its size but most of them can. I would say that using a few is better than using none. According to Kaplan and Kaplan (1989), a view over green environment does help with restoration and reduction of stress, and adding more pocket parks, more small green areas in the city will lead to that more windows will have a green view.

Prospect and Refuge theory can be used when designing pocket parks to help to understand the balance of prospect and refuge, to help with designing a park that feels safe for the visitor. If the visitor feels safe then there is a better chance that the park feels inviting and that in turn will lead to that the visitor will appropriate the park during some time (territoriality). If the visitors feel safe and like the park there is a possibility that they will protect it and take care of it, but if the the visitor feels unsafe he/she will most likely avoid the park.

Territoriality and personal space are two theories that are not specifically developed for natural environments but I think they both can be useful, and one can learn from them and use them to get an understanding on human behaviour and what environments we prefer and why.

For a designer to make the park inviting, one needs to understand size of space and usage of different spaces. To understand the importance of having different rooms in the design of the park to offer different activities for different needs, and this can be connected to personal space. The possibility of having different rooms is however limited in a pocket park due to the smaller size of the park. SRT's 'depth' can be created in a pocket park, however, here as well the small size of the park will be a limitation to achieve 'depth'.

There needs to be, according to Arousal theory, a balance/mixture of characteristics in the environment that increase and decrease the arousal level. This can in turn be connected to the other theories. Complexity, ambiguity/uncertainty and novelty increase the arousal level while patterns and familiarity decrease the arousal. These different characteristics can be connected to ART and SRT. Complexity, ambiguity/uncertainty and novelty can be connected to ART's 'fascination' and SRT's 'complexity'. Patterns and familiarity are consistent with ART's soft fascination.



How some of the SRT's different qualities can be connected to ART, prospect and refuge and PSD:

**Complexity** is comparable to ART's "fascination" and PSD's "rich in species".

**Focalilty** is comparable to ART's "fascination" and "extent" and Appleton's and PSD's "prospect".

**Depth** is comparable to ART's "extent" and Appleton's and PSD's "prospect".

**Ground texture** is comparable to ART's "extent" and Prospect and refuge, the ability to move around without fear.

**Deflected vistas** is comparable to ART's "fascination" and "extent". There is a mystery and one gets curious and wants to explore. This is as well comparable to Appleton's secondary prospect.

**Lack of threat** is comparable to Appleton's and PSD's "refuge" regarding feeling safe.

**Structural properties** is comparable to ART's "soft fascination" regarding patterns.

**Flowers** is comparable to ART's "fascination".

**Unthreatening wildlife** is comparable to ART's "fascination".

I think that the feeling of 'being away', to get away for a while from one's everyday obligations, is important to elicit restoration. By combining these different theories and their information I think one can get good help to understand what is needed in a park and particularly in a pocket park.

# RESEARCH ON HEALTH BENEFITS OF PARKS AND PARTICULARLY POCKET PARKS

A park, a garden or a natural area is something that can activate all our senses, smell, hearing, taste, touch and sight. It can as well activate the senses of our muscles, the temperature and touch which is quite unique. A park can have many different functions such as physical training, meeting friends, relax, sit and observe etc. It is important that a public park is designed in such a way that it can be used and is accessible to everyone. The design should be flexible and it is important to remember that a park is something that is constantly going through an ongoing process of change (Stigsdotter & Grahn, 2002). An important feature of a park is the border and how it is shaped (Stigsdotter & Grahn, 2002), and the border could for example be a wall, a high difference of the ground, water, a hedge, a line of trees, bushes or a change in the ground material (Nordh et al., 2009). The border will help to define the park from the surroundings and can help the visitor to get the feeling of being away and the feeling of being safe. A park/green environment is built with help of a floor (ground materials such as gravel or grass), walls (e.g. hedges) and a ceiling made out of the tree canopies. This will give the visitor a three-dimensional experience as well as the experience of time. If the park has many different characters in different rooms it is more likely that a visitor will be able to find a place that suits that persons intentions for that day. There should be a balance in the park so that the individual finds a balance between experiencing the area, being in it and being active in it (Stigsdotter & Grahn, 2002).

If the distance between people's homes and an open green space is too far it will lead to that people will visit the green space less often. If the distance is short, in other words, it won't take people very long to walk there, it does most often lead to that people will visit the area more frequently. People who live in cities, where there are no green spaces nearby, suffer from more stress than people who have a closer access to green spaces. It has been shown in research (Grahn & Stigsdotter, 2003) that if there is a close access to green space near people's homes it will lead to more usage of the area and that will in turn lead to less people who suffers from stress. Having more green environments closer to people's homes in the cities will not only lead to lower levels of stress but it can as well help people with their health in other ways. It can for example help with fighting cardiovascular diseases and obesity (Grahn & Stigsdotter, 2003). All kind of green environments will help

with this. Different shapes and sizes will give people the ability for different kinds of activities and experiences. In Denmark research has shown that people who have further than one kilometer to the nearest open green space have a health that is poorer compared to people who have closer than one kilometer to nearest open green space from their home (Stigsdotter, 2012).

Kjellgren and Buhrkall (2010) did during their research tests with participants who suffered from stress and burnout syndrome. The participants were divided into two groups where one group were resting for thirty minutes in nature and the other group were watching a video of nature for 30 minutes. They measured the participant's pulse and blood pressure before and after the 30 minutes and the participants had to answer questions after they had been relaxing. The participants who were relaxing in nature had a lower pulse and a lower blood pressure. They felt that relaxing in nature gave them more energy and that their 'altered state of consciousness' was higher. Their senses were improved, they felt in harmony with nature, they felt positive, their feeling of well-being improved and they could relax without effort. The participants who watched the video did not achieve the same results. Those participants felt anxious, they couldn't relax, they couldn't stay focused on the video and they felt that they were not satisfied. The video did however lower their pulse and their blood pressure. In other words, both the natural environment and the video of a natural environment did reduce stress but the natural environment had a more positive effect. Maybe one of the most important results from this research is that the participants (who suffered from stress and burnout syndrome) who were relaxing in the natural environment had many positive experiences even though they had to do a task, that was stress inducing and required the directed attention, after their short time of relaxation.

A pocket park in a city can provide possibilities for restoration near one's home or work in a busy environment (Nordh et al., 2011). I have not found, during my research, any specific definitions for pocket parks, it seems that it depends on what city one is in. Nordh (2010) worked during her research with green areas that are  $<3000 \text{ m}^2$  and Peschardt (2014) worked with areas that are  $<5000 \text{ m}^2$ , which is what the city of Copenhagen defines as a pocket park.

Peschardt's (2014) research about pocket parks in Copenhagen indicates that pocket parks are often used and that they are used by people in all age groups, men and women and all education levels. During the collection of data, Peschardt could see that women used the park more frequently than men and that the pocket parks were mostly used on the way to or from for example work or home. This indicates the importance of having pocket parks nearby peoples homes and their daily routes through the city (Peschardt et al., 2012; Perschardt, 2014).

People visiting the pocket parks mostly did so to get some rest and restoration. The fact that people mostly used the pockets park for this and that people used the parks on their way home from work indicates that they probably are in need of breaks from their work or other daily stressors.

Peschardt in 2014 developed the eight PSDs by Grahn et al. further in her PhD thesis and she modified them for pocket parks (see text box 5).

The results from Peschardt's (2014) study shows that the PDS's 'serene' and 'social' were the two characteristics that were mostly preferred. The PDS characteristic 'social' has in other studies (Grahn & Stigsdotter, 2010; Nordh et al., 2011) been seen as a negative characteristic when it comes to reduction of stress, but in Peschardt's study 'social' were as much preferred by stressed participants as the characteristic 'serene'. 'Serene' was associated with surroundings that are calm and silent, and 'social' was associated with rooms within the park where social interaction could take place. 'Nature' was associated with ART's component 'being away'. This indicates that the visitor would get a better feeling of 'being away' if nature is available on site and that stressed individuals are in a need of distancing themselves from everyday stressors. Other PDS characteristics that the participants who suffered from stress preferred were: 'refuge', 'space', 'nature' and 'social'. A designer should, according to Peschardt, when designing a pocket

**Perceived Sensory Dimensions for pocket parks developed by Peschardt, 2014 pp. 38-39**

**Serene** - Silent and calm, no bikes, not crowded, no mopeds, clean and well maintained, no traffic noise, feeling of safety.

**Nature** - Nature quality, wild and untouched, free growing lawns, not crowded, feeling of safety.

**Rich in Species** - Natural plant and animal populations, many native plants to study.

**Space** - Spacious, areas not crossed by paths, lots of trees, places sheltered from the wind, sunny places, shady places, places where people can gather.

**Prospect** - Plane, well-cut lawns, small ball grounds.

**Refuge** - Many bushes, sandpits, tables and benches, play equipment, feeling of safety.

**Social** - Entertainment, restaurants, paths made of gravel, good lighting, access to restrooms, places sheltered from the wind, sunny places, shady places, several seats and benches, tables and benches, plenty of people, feels safe, paths with hard surface.

**Culture** - Fountains, statues, foreign plants, flowers.

*Text box 5*

park for rest and restoration, avoid noise and a view to the outside. Stigsdotter (2012) found during her research that the PDS dimensions preferred by most people in the following order: 'serene', 'space', 'nature', and 'rich in species', 'refuge', 'culture', 'prospect' and 'social'. The dimensions that were preferred by stressed individuals were 'refuge', 'nature', 'rich in species' and a little bit of 'social'. These dimensions creates an environment that stressed individuals found restorative. Public urban green spaces should, according to Stigsdotter (2012), be seen as linked areas through the city and not as isolated areas, it should be seen as a linked green network.

Nordh et al. (2009) found during their research that the design and the components of a park are more important in making it restorative than the size of the park. When talking about components Nordh et al. referred to the park's floor being defined by low plants, grass or some kind of hard material, the walls being defined by trees and/or bushes and the ceiling being defined by tree canopies. The design of the pocket park can make it feel bigger than it actually is. They could see that a pocket park containing some components gave as much possibilities for restoration as a larger park containing the same components (Nordh et al., 2009). The most common activity in a pocket park has been shown to be relaxation, and this applies to all age groups (Peschardt et al., 2012; Nordh & Østby, 2013). This indicates the importance of design and the importance of using space right in a society where densification is a problem.

Nordh et al. (2009) connected their research to ART components (Kaplan & Kaplan, 1989) and they could see that size and water was something that influenced 'fascination' and trees, size, grass and bushes was something that influenced 'being away'. The participants' answers in the research on the likelihood for restoration in a pocket park are in line with ART's argument that a more natural green environment is better for restoration (Kaplan, 1995). Something more that the participants saw as important for restoration was good 'seating', 'enclosure' and 'calm atmosphere'. In 2013 Nordh and Østby did a new research on the restorative qualities in a pocket park and categories that were rated high in this research were 'a lot of grass', 'water feature' and 'a lot of flowers/plants'. Their research was done as well with ART as a background and these categories can all be connected to ART's argument about natural environments, in agreement with the results achieved by Nordh et al. (2009). Categories that were rated as bad for the likelihood for restoration were 'a lot of traffic', 'poorly shielded from the surroundings' and 'a lot of hard surfaces' (Nordh & Østby, 2013). A pocket park can, even though it is small, give people a feeling of that they are away. A pocket park with features that are interesting and with a good cover from the surroundings can make the visitor "forget" that the park is located in the middle of a city (Kaplan et al., 1998). The fact that a pocket park can be as restorative as a

larger park, if it has the same components, can make it more possible to increase the number of smaller parks and the number of components that improve peoples health in our cities that are being densified (Nordh et al., 2009; Nordh and Østby, 2013).

Activities that are preferred in pocket parks, according to Nordh and Østby (2013), are 'eating and drinking', 'relax and philosophize' and 'reading'. Something else that was seen as important is the possibility to be able to sit by yourself. There is a need of being able to have some privacy but there should be possibilities to socialize if one chooses to do that (Pescharde's, 2014; Nordh & Østby, 2013). Activities that were preferred according to Pescharde et al. (2012) were 'socialising' and 'rest and restoration'.

ART's dimension 'extent' is important in a green environment to make it a good place for restoration. This can be achieved in a pocket park if the design gives the visitor a feeling of that there is more to see. Elements that can help with that can be, a path made out of stepping stones that will urge one to stop and see what is on the ground, paths that are circuitous which can make the area feel bigger than what it is and resting points being placed in areas where one can't see the whole park (Kaplan et al., 1998).

A small park in a city can help one to feel separated from the city when visiting the park. This can be achieved with ground materials of different textures; a border of for example trees and bushes will make one feel enclosed and not distracted by what is going on on the outside, and tree canopies (as a roof) will as well help with enclosure and limit the space and sight above one's head. The enclosure will separate one from the surroundings and it will give privacy and clearness (Kaplan et al., 1998; Nordh, 2010). By using attention to details and enclosure one can create a small space that is inviting (Kaplan et al., 1998). A park that is surrounded by tall buildings is experienced as smaller compared to a park of the same size that is surrounded by one-two story buildings (Nordh, 2010). Taller buildings have a negative effect on the feeling of being away which can affect the likelihood for restoration (Lindal & Hartig, 2013).

For a park to be beneficial for well-being one needs to get an understanding of what it is that prevents people from visiting a park and what it is that makes people visit it (Pitt, 2018).

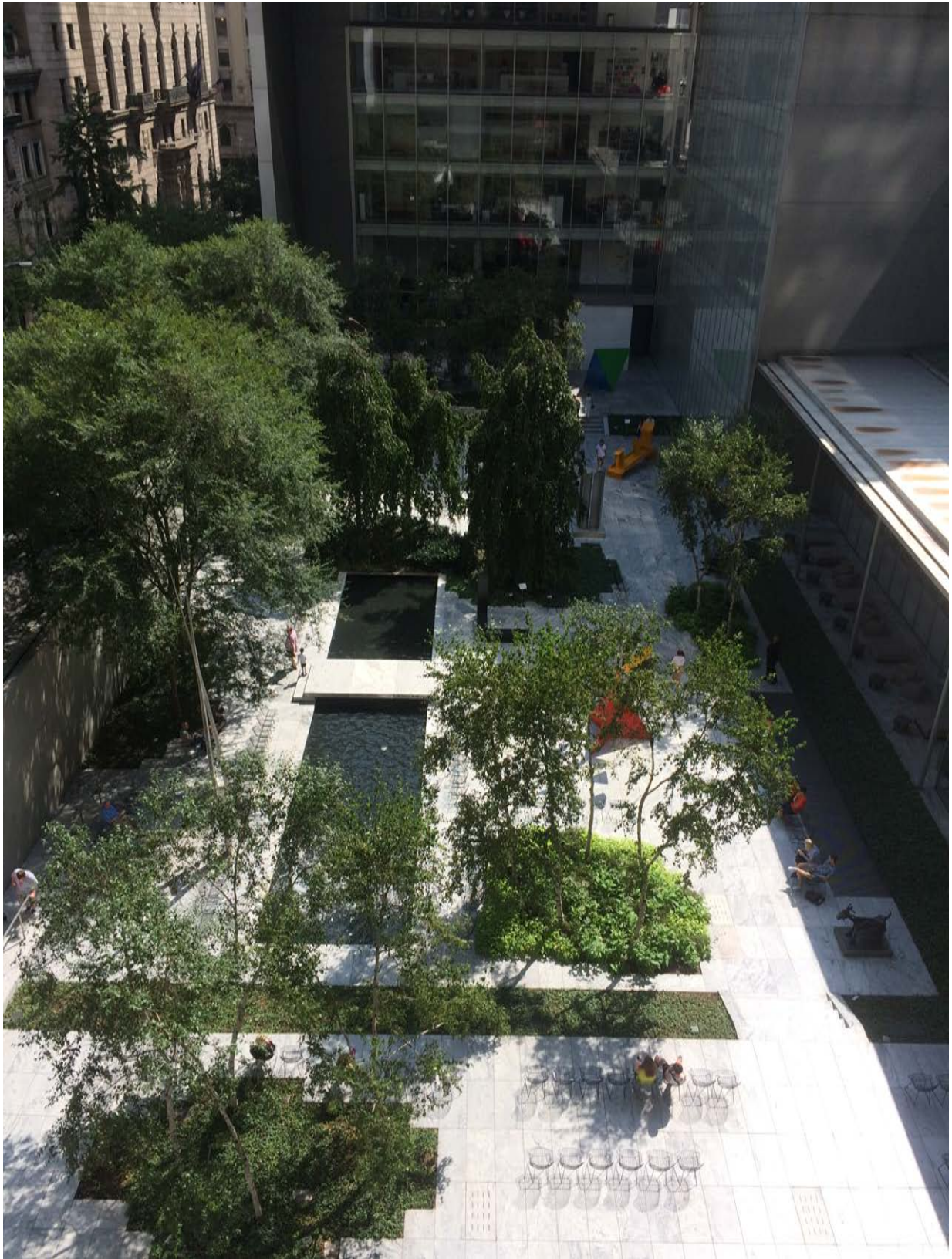
## THE RESTORATIVE EFFECT OF WINDOW VIEWS

**B**y adding more pocket parks in a city one would give more people a greener view from their residential window as well as the windows of people's work. According to Kaplan (2001), the view of nature from a window will encourage our mind to wander which will help to restore our directed attention. The view of a garden with for example shrubs and flowers is important for us to be able to function effectively and for us to be satisfied with the neighbourhood. The possibility to check the weather and the sky from one's window and the possibility to be involved through activities in the environment is important as well for us to function effectively. Having trees in the view can give a feeling of a 'greater depth' and a feeling of peace (Kaplan et al., 1998; Kaplan, 2001). Having a view over built environments and busy streets can make people feel less satisfied with the neighbourhood but it does not have a negative effect on people's well-being (Kaplan, 2001). Having a view that one prefers would presumably be the best for that persons well-being and satisfaction. Kaplan (2001) however found out, during her research, that the view of nature plays a more important role in people's satisfaction and well-being compared to preferences. Kaplan and Kaplan (1989) and Kaplan (2001) suggest that having a view of nature will help to maintain restoration, that it will help people to feel in contact with nature and that it invites our minds to drift away.

A study involving students living on a campus, Tennessen & Cimprich, (1995) showed that the students who had a view with nature performed better on tests and they rated their directed attention capacity as stronger compared to the students who did not have a green view. The view over nature did however not affect the mood of the students. This suggest that a view over green environments does have a positive effect on our minds and that they give a possibility for restoration. These results do as well show the importance of placements of buildings and green environments, and how they should be integrated.

Having a view that looks down on to a green environment (as seen in Figure 4) will give a new perspective on the area. It can create curiosity and possibilities for the viewer to wander of in the mind and imagine being in the area and exploring what can't be seen in the view. It is not just the view from a window that is good. A green environment in a city will give a better view from other kinds of vantage points which are as important as the view from a building (Kaplan et, al., 1998).





*Figure 4. A view from a window, MOMA, New York. Photo: © Anna Bärq*



# THE RESTORATIVE EFFECT OF SOUNDSCAPES

I have so far mostly discussed visual aspects, but sound is something that is as important as visual for restorativeness.

When experiencing an environment one uses many different senses and the soundscape can play an important role in giving an individual a restorative experience that is positive (Payne, 2009). In her research, Payne (2009) saw links between the soundscape and the psychological restoration. She saw that well designed parks in an urban setting can provide restorative experiences visually as well as acoustically.

There has been different kinds of studies made on soundscapes in a city. Many of the different studies came up in the end with the same result, that natural sounds are more preferred than sounds of a city (eg. traffic sounds, mechanical sounds) (Irvine et al. 2009; Payne, 2009; Yang & Kang, 2007). Irvine et al. couldn't see during their study that preference of sounds was depending on age compared to Yang and Kang who got the results that younger people (age 10-17) had a higher tolerance and preferred more the sounds of a city compared to older people (age 30 and up) which preferred natural sounds. Yang and Kang's (2007) results shows that natural sounds are more preferred in a city and especially the sound of water and that the sound of water improves the soundscapes in cities dramatically. They however argued that it is important that the sound level from the water should not constantly be same, it should differ so that people won't loose interest which would with time have a negative effect on peoples psychological adaptation.

Ratcliff et. al. (2013) studied if bird sounds had restorative effect or not. When talking to their participants about restorative environments, bird sounds where the sound that was the most mentioned followed by the sound of water. It was certain bird sounds (e.g. song-birds) that were giving the participants a better restorative experience because they had an positive affect and lowered the arousal level while other bird sounds (e.g. gulls, ravens, birds with unmelodic sounds) had an negative affect and did not improve the restorative experience. What bird sounds an individual found restorative was linked to where they were from and the familiarity to the sound. The participants of this research said that the sounds of birds was something that helped them focus on something else, that it helped them to not focus on what was stressing them and what they were trying to get away from. They thought that the bird sounds helped them to get the feeling of

being away when being in green environments, that it helped them with their stress recovery and that the bird sounds were symbolizing well-being and vitality of the nature in the area.

Another study done by Irvine et al. (2009) showed that the better the biodiversity was in city parks the better the parks generated psychological and ecological benefits because of the sounds being more natural because of a more diverse wildlife.

Payne (2008) looked at soundscapes in two different parks in Sheffield, The Botanical Gardens which had more areas with planting, and Weston Park which had more turf. Both parks had almost the same amount of water areas and tree canopies. They are both close to the city center and have busy roads along them. The participants were given a list with different sounds and they had to say what they heard the most. The sounds that were heard the most, 60-70 % of the time the participants were visiting the parks, was happy people and natural sounds. These results suggest that these kind of sounds did not disappear in the sounds of the busy roads surrounding the parks and the life of the city. A study of the soundscape at the rehabilitation garden in Alnarp, Sweden, suggest that natural sounds can be used to diminish the negative sounds from for example traffic. Some of the participants in Alnarp explained how the sound of rippling water "took away" the sound of the traffic from the motorway that runs nearby (Cerwén et. al., 2016).

Payne (2008) noticed as well during her research that participants with hearing problems reported the parks as less restorative because they couldn't hear certain frequencies (e.g. bird sounds) compared to the participants with no hearing problem. This suggest that the soundscape plays an important part on how people perceive a place and that it can help with giving people a better restorative experience.

Krzywicka and Byrka (2017) did two different studies. In the first study the participants were listening to urban and natural environments and they were then asked to rate if the sounds were positive or negative, if they recognized the sounds and if they thought the sounds had restorative qualities. In the second study they investigated if urban surroundings (that the participants from the first study evaluated as positive) gave a restorative experience compared to natural environments. Both studies gave the result that the natural soundscape is more restorative than the urban soundscape. For example, a walk in a natural setting with bird and water sounds were seen as more restorative than an urban walk with sounds from an amusement park and an old town. Urban sounds from the first study that were evaluated as positive were concert, fireworks display, old town, amusement park and café and all natural sounds were assessed as positive, especially soundscapes from water and birdsongs. Krzywicka and Byrka connected their studies to Attention Restoration Theory and they could see

that natural environments and the soundscape of that environment evoke soft fascination while the urban environment and the soundscape of that environment evoke hard fascination. Their results show the importance of natural environments and soundscapes in an urban setting, and the importance of a balance between the urban and the natural to be able to give the residents a possibility for restoration within a city.

In his book, Schafer (1994) talks about soundscapes and how they have been used and seen through history and how they have been used in different ways. He talks about soundscapes in many different environments and he argues that, when it comes to natural sounds, it is important to let nature speak for itself. That the sounds nature makes naturally are very important and can be the best sounds one can listen to. He talks about how important it is to keep it simple and not to complicate things. For example, he explains how one can create different sounds with water by letting streams of water hit different materials, surfaces and resonating shapes. Another way of keeping it simple is to use different materials for the paths. He had students who he asked to do "soundwalks" to explore the soundscape of different areas and environments and one of his students said (p. 213): *"If I can hear my footsteps as I walk, I know I am in an ecological environment"*. Participants in the rehabilitation garden in Alnarp, Sweden, said that a path made out of gravel helped them hear what was happening around them. They could hear if someone was coming. This made them able to have control of the situation and they could choose to meet someone or they could choose not to, which was seen as very important for the participants. Paths made out of softer material such as wood (e.g. wooden chips) made them slow down their walking speed and it had a softer sound when someone walked on it (Cerwén et al., 2016).

## THE RESTORATIVE EFFECT OF WATER

**H**ouses that are located near water (e.g. lakes, ponds, ocean, rivers) are often very sought after and are more expensive. This is because water is something humans prefer. The type of water edges that humans tend to prefer are the edges that have a natural form with vegetation (Kaplan et al., 1998). Water that is polluted, that has a bad smell and an unnatural colour is however not very appreciated (Kaplan et al., 1998; Pitt, 2018). Different studies have shown that a built environment that contains some kind of water is more preferred and seen as more restorative than a natural environment containing no water (Völker & Kistemann, 2011; White et al., 2010). An urban environment that contains water is more interesting and it increases the ability for restoration compared to an urban environment without water (Völker & Kistemann, 2011). For example, a square with a fountain will add a blue element in the grey environment which will

create an atmosphere that is seen as special. This will in turn lead to an 'emotional bonding' that will lead to an appropriation that is health related (Völker et al., 2016). The environment that is preferred the most according to White et al. (2010) is a green environment that contains water. This type of environment has been shown to be the best and highly evaluated for restoration (White et al., 2010). What is important when it comes to water is that it should be diverse and the edge where water meets surrounding land creates an interesting and an important environment (Völker & Kistemann, 2011; White et al., 2010; Pitt, 2018). Environments containing water have a positive effect on humans, they can reduce stress, depression and anxiety and they can give the visitor an intensive restorative experience (Völker et al., 2016). What is highly valued with water is the humidity, the diversity, all the different kinds of wildlife it can attract, the sound, the colours, its motion (Völker & Kistemann, 2011), the interaction water can have with different materials and light (Pitt, 2018; Schafer, 1994), and all the different reflections that can occur on the surface, all the different patterns. The sound of the water is often seen as having a relaxing effect on people (White et al., 2010). Having more places with water in a city will provide more spaces that will have a positive effect on people's well-being (Völker et al., 2016). The bigger the water surface is the better effect it has on people (White et al., 2010) and people who live less than two kilometers from a lake or the ocean are more content with their lives compared to people living more than five kilometers away (Gascon et al., 2017). This supports the findings that people who live near water have better mental health (Völker et al., 2016).

Paley Park in New York (see Figure 5) is a very famous pocket park that is loved by the people living in the city and by visitors. Untapped Cities (2019) is a website where they bring up, what they think, is spectacular about New York City. In an interview with Rosemary O'Brien, who has written a book about the best pocket parks in New York, does she describe how Paley Park is perceived by people in the city. She explains that the park is something that most people like, as she puts it: "What's not to love?". She says that the green walls that is created by ivy, the seating options, and the big waterfall creates a small oasis in a very busy city. The sound of the waterfall makes it feel like one is entering a new, different area. It takes one away from the city and the sound does as well drain out the noise from the city very well. For me this is a good description of how much a small green pocket in a busy city makes a difference and how much impact noises and sounds have on a person's reaction to an area.





Figure 5, Paley Park in New York  
Photo: Jinjian Liang

*"With 1800 gallons of water per minute cascading through its waterfall at the back of the space, you will find yourself transported to a place filled with peace thanks to the white noise of the waterfall that successfully drowns out the noise of the city beyond the entrance."*

Untapped Cities, 2019

# GUIDELINES/RECOMMENDED ELEMENTS

I will in this part answer two of my research questions:

What elements does a pocket park need to include and how should it be designed for it to provide likelihood for restoration?

Will the amount of people who use the park be a problem for the restorative qualities?

The theories and the research about green environments I have described so far have different aspects and results that have provided information on what it is that is important in a green environment to make it restorative. I am focusing on pocket parks in this thesis and some aspects and results will be more obtainable in a pocket park due to its small size while others will be harder to achieve. I have therefore focused on some aspects and results that I think are more feasible in smaller environments. I am presenting the different components/elements in this part.

The size of a pocket park can vary, it can be small, just a few square meters, or it can be as big as 3000 m<sup>2</sup> to 5000 m<sup>2</sup>. People are all different and we prefer different things. It is hard to make a design that suits everyone's needs and what is preferred one day might not be preferred the next, depending on how one is feeling on that day. For a pocket park to give the visitor a restorative experience, I think will be more possible, if the park has different rooms and a fascinating and varying design and materials (plant materials, path materials, water etc). By having different rooms in the park it will give people different stimuli which will give a good arousal level. The amount of rooms in the park will however be limited due to the size of the pocket park. The bigger the park is the more rooms with different characters can be increased.

The next section will explain important elements within pocket parks that elicit restoration, based on knowledge gathered from the literature study.

# VISUAL

**S**ight is one of the senses we use when we are in a park. It is according to SRT and ART important to have different kinds of visual components in a park to make the visitor fascinated and curious, and thereby make it a restorative experience.

The environments we humans are in should not be overwhelming and provide a good flow of information, stimulation and challenges to our central nervous system (Bexton, Heron & Scott, 1954; Kubzanski, 1961, see Berlyne, 1966). A pocket park is built with help of a floor (e.g. grass), walls (e.g. hedges) and a ceiling (e.g. tree canopies) and they will, as earlier mentioned, give the visitor a three-dimensional experience and an experience of time (Stigsdotter & Grahn, 2002). In the next part of the thesis I will explain different components that visually has a positive effect on the environment for it to elicit restoration and examples of components that increase and decrease the arousal level.



## Focal point

**A** focal point in a pocket park will give the visitor something interesting to look at. Something that will spark their curiosity and fascination. The feature can stand out for it to attract the viewer. One can for example use something dramatic as the waterfall in Paley Park (see Figure 5, p. 45), a statue, a water feature (see figure 6), a plant with spectacular colours or similar as a focal point.



*Figure 6. A water feature as a focal point, private garden in Melbourne, Australia.  
Photo: © Anna Bärq*

## Deflected vistas

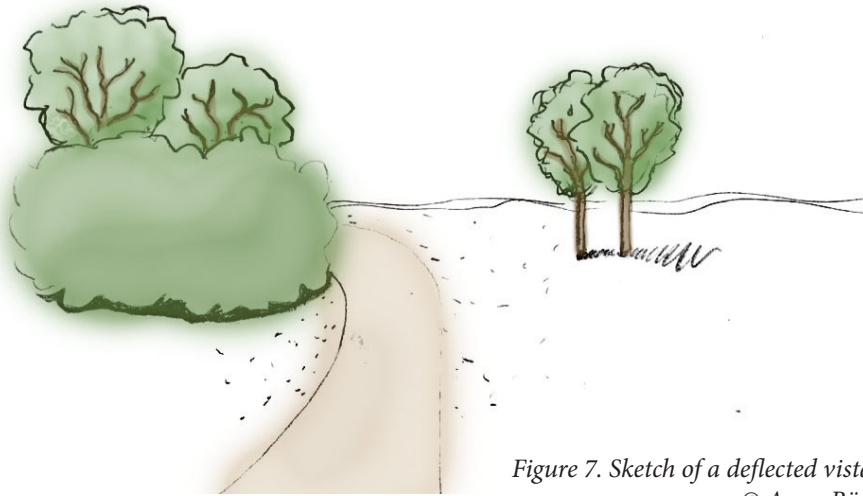


Figure 7. Sketch of a deflected vista.  
© Anna Bärq

**T**o give the visitor the feeling of ART's dimension 'extent', the components "deflected vistas" from SRT and Appleton's 'secondary prospect' is needed. This can be achieved with different kinds of sight lines such as paths, streams etc. that are partly hidden/curved (see Figure 7-9) which will provide the feeling of curiosity and fascination for the visitor. What is on the other side? As Kaplan et al. (1998) and Nordh (2010) argue for, it is important that the visitor gets a feeling of that there is more to see. This will not only provide curiosity and fascination for the visitor, it will as well make the park feel bigger.



Figure 8. An example of deflected vista,  
Laholm, Sweden. Photo: © Anna Bärq



Figure 9. An example of deflected vista,  
Malmö, Sweden. Photo: © Anna Bärq

## Edges/borders

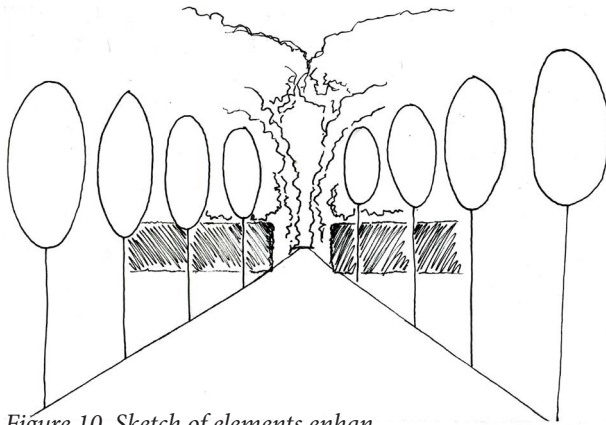


Figure 10. Sketch of elements enhancing a park entrance. © Anna Bärög

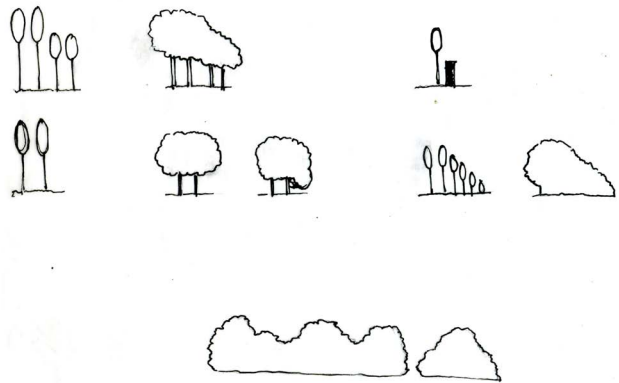


Figure 11. Sketch of examples of edges/borders. © Anna Bärög

The different theories and the research I have read for this thesis say that borders are important to the park. That the borders will help to define the park and they will help the visitor to get the feeling of being away (Grahn & Stigsdotter, 2002; Nordh et al., 2009). Kaplan et al. (1998) say that a border can make the visitor "forget" that the park is located in the middle of a urban environment and Nordh and Østby (2013) saw that a park that was poorly shielded from the surroundings was not as restorative as a park that was (see Figure 11 for examples of edges/borders). I would say that the entrance to the park is as important as the borders and I think that there should be a clear entrance to the park (see Figure 10) so that there will be a big change from going from the speed and the grid system of the city in to a softer, not so strict green environment, with a wilder impression and with a slower speed (see Figure 12).

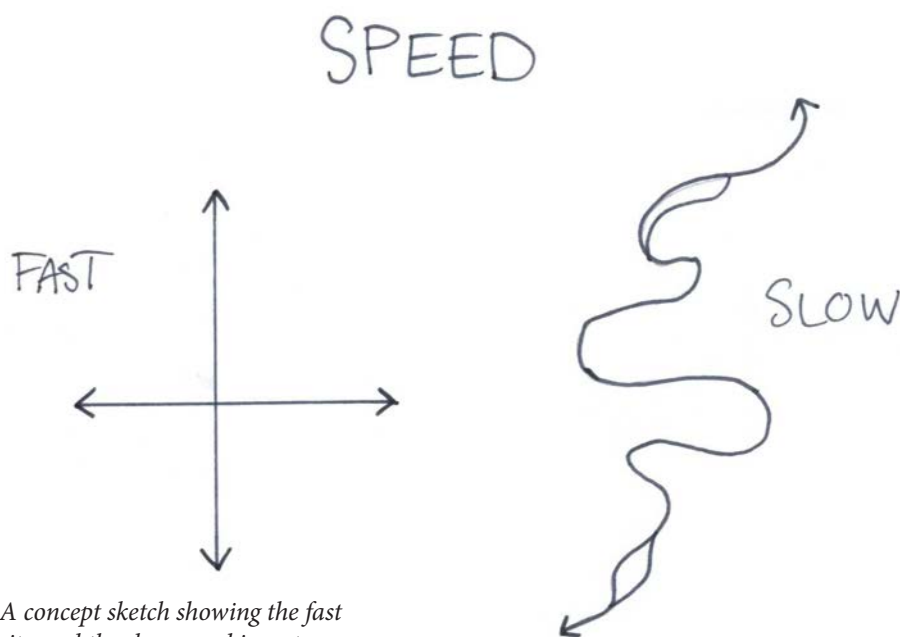


Figure 12. A concept sketch showing the fast speed of a city and the slow speed in nature © Anna Bärög



## Depth

**T**o create depth in a pocket park can be challenging, again, due to the small size. But I think it is important to try and achieve some degree of depth to make the park feel bigger for the visitor, to get a feeling of space and openness. By using perspective one can create depth (see Figure 13).

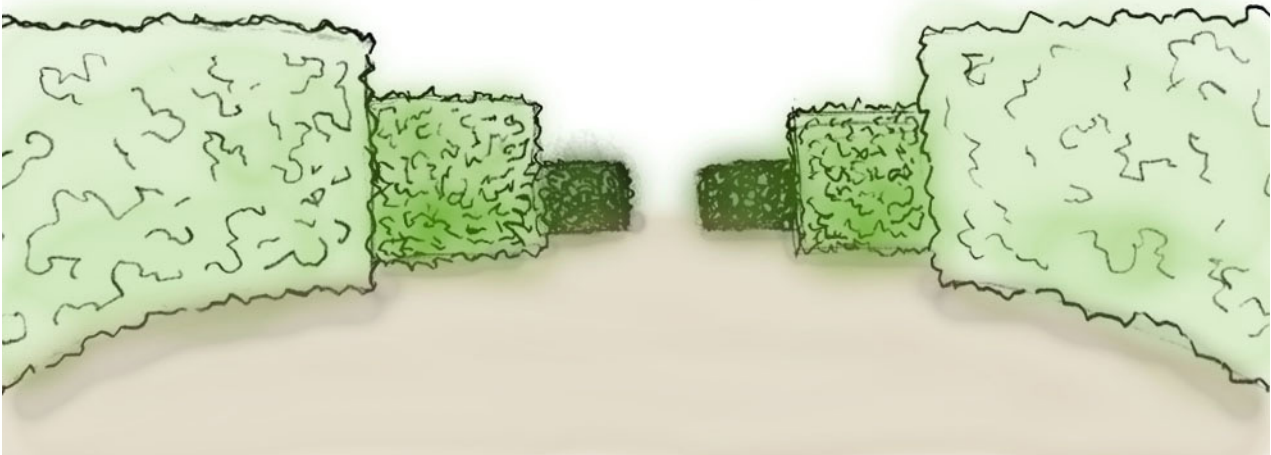


Figure 13. Sketch of a perspective.  
© Anna Bär

## Wildlife

**T**he sign and sight of unthreatening wildlife is a positive thing. It is something that fascinates most people and it is important according to SRT, ART and PSD (see Figure 34-37, p. 59).

When designing a pocket park one can use some plant species that will attract animals and insects to increase the number of wildlife in the park. Flowers during spring, summer and autumn, some berries as food for the animals and some bushes etc. that humans can't get in to so that they can get some protection. The different tree species, bushes, annuals and perennials that flower will not only attract wildlife, it is as well visually pleasant for the visitors.

For more information see under the section 'Sound' on p. 59.



Figure 14. A garden with a wild impression, Heide Museum of Modern Art, Melbourne Australia.  
Photo: © Anna Bärge



Figure 15. A garden with a wild impression, Heide Museum of Modern Art, Melbourne Australia.  
Photo: © Anna Bärge

## Wildness

**A** natural and "wild" nature is according to ART the best for restoration. I think it can be hard to achieve the look of a wild, untouched forest in a pocket park in an urban environment. However, by having soft edges, curves, free growing bushes etc. (see Figure 14-16), I think will give the impression of a more "wild" park and not so strict. This will brake the grid system of the urban environment and give the visitor fascination, curiosity and a feeling of being away.

To have a variation in the plant species I think will help to make the park interesting, for it to elicit fascination and curiosity. Nordh and Østby (2013) saw that a quality that was highly valued for restoration was 'a lot of flowers/plants'. I think it is important that there is something interesting and beautiful to look at throughout the year. This can be achieved by using species that flower during spring (see Figure 16), some that flower during summer (see Figure 14-15), some during autumn, species that have bright autumn colours and species that are interesting during winter. One can as well use plants with different colours, textures etc. in a garden bed to create an interesting view.

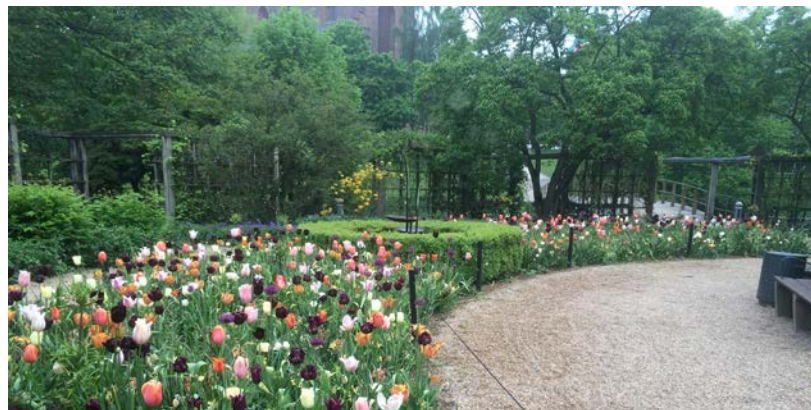


Figure 16. Perennial border in Odense, Denmark. Photo: © Anna Bärge



## Roof



Figure 17. An example of a pergola with *Wisteria Sinensis*, private garden in Melbourne, Australia. Photo: © Anna Bärq

A pocket park in an urban environment is normally surrounded by taller buildings and that can make the park feel smaller than it actually is (Nordh, 2010) and the taller buildings do as well have a negative effect on the feeling of being away which in turn can have a negative effect on the likelihood for restoration (Lindal & Hartig, 2013). Kaplan et al. (1998) suggest to use tree canopies as a roof (see Figure 18-19) to limit the sightline above the visitors head, to take everything down to human scale and to separate the visitor from the urban environment even more. This I would say is more important in urban environments that has very tall buildings.

I suggest that one can use other green alternatives as a "roof" to limit the sight above the visitors head. One can for example have a pergola around and above a seating area and the plants growing up on the pergola can be a species with a lot of flowers (see Figure 17) or maybe evergreen species. Although I do think that it is important to see the sky, that the whole park should not be enclosed above the visitors head. Have some areas with "roofs" and some with an open sky so that the visitor can choose what he/she prefers for that day. Then one can work with different tree species with different density in their canopies to create different "roofs" with different density and different levels of enclosure.



Figure 18. An example of a path with a green roof, Fredriksdal's, Helsingborg, Sweden. Photo: © Anna Bärq



Figure 19. An example of what it can look like with a green roof, Botanical garden, Rome, Italy. Photo: © Anna Bärq



## View from a window



*Figure 20. A green city, Old City Philadelphia, USA  
Photo: Dominic Lacivita*

A pocket park will not only be appreciated by people on the ground. People who are living in houses near the park, who have a view over the park, will have a green view (see Figure 20-21) which has been shown to make people more satisfied with their neighbourhood, and that a green view makes people curious and it helps them with restoration (Kaplan et al., 1998; Kaplan, 2001).



*Figure 21. An example of a Baroque garden in Amsterdam. This is interesting to look at from the ground as well as from above. Photo: Николай Начев*



# Water



Figure 22. Small water fall with a natural look, Botanical garden, Rome, Italy. Photo: © Anna Bärge



Figure 23. A pond with a natural edge, Nacadia, Denmark. Photo: © Anna Bärge



Figure 24. Pond with water lilies, Skärhamn, Sweden. Photo: © Anna Bärge

**W**ater is something we humans like to look at. Water has a positive effect on us. It can reduce stress, anxiety and depression (Völker et al., 2016; White et al., 2010) and it is highly valued for restoration (Kaplan et al., 1998; Nordh & Østby, 2013). The different colours water can have, the motion of the water and all the different patterns, the reflections and the interaction with light that can occur on the water surface is something that can elicit fascination and curiosity (Völker & Kristemann, 2011). The type of water environments that is preferred the most is calm and slow-moving water (Ulrich, 1993) (see Figure 22-23) and water with a natural edge (see Figure 23) with some vegetation (Kaplan et al., 1998) (see Figure 24).

Water in a park will help to attract wildlife (animals and insects) which is good for fascination. It will provide a natural sound to the park if it is moving and water plants can be used to create an interesting environment (For more information, see under section "Sound", p. 58-59). Being near water can enhance the visitors feeling of fascination and extent with help of the sound moving water makes, the reflections that can occur on the water surface, the different animals and insects that get attracted by the water and the different type of water plants that can be used (Pitt, 2018).



## Patterns and colours



Figure 25. Photo: © Anna Bärq

**P**atterns and colours are things that will provide fascination for the visitor. These can be made by different kind of structural properties such as foliage from trees or the tree trunks (see Figure 28) creating patterns on the ground with help of light. The reflections on the surface of water, different plants to give different structures and colours (see Figure 25-27, 29) and different ground material will as well help to create this. This is according to Ulrich (1983) an important component (he calls this 'structural properties') and this is as well something that will give the visitor 'soft fascination'. Berlyne (1960;1966) argues as well for the positive effect that patterns have. I think that it is important to work with different structures, patterns and colours to make the park interesting.



Figure 26. Patterns in nature. Photo: © Anna Bärq

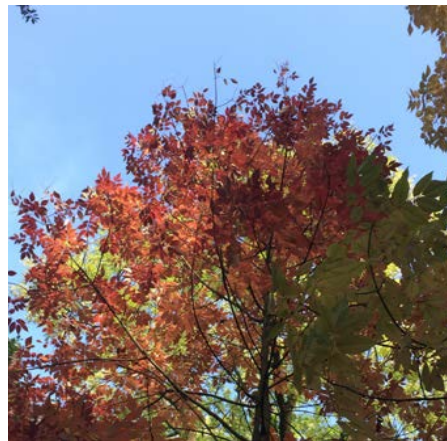


Figure 27. Autumn colours. Photo: © Anna Bärq



Figure 28. Shadows on the ground. Photo: © Anna Bärq

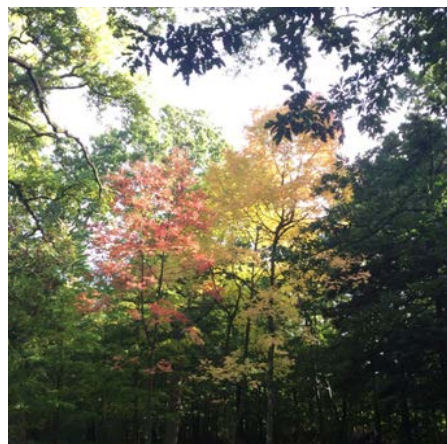


Figure 29. Autumn colours. Photo: © Anna Bärq

## SOUND

**S**ound is another sense we use and the sounds in an environment affect the way we interpret it. The sounds of nature have been shown during research to be more preferred than sounds from example a city (Irvine et al., 2009; Payne, 2009; Yang & Kang, 2007). Payne (2008) saw that people with a hearing problem did not have the same and not as good restorative experience in a park as the people who did not have problems with their hearing. Cerwén et al. (2016) and Payne (2008) saw that the natural sounds in the area (e.g. the sound of water and birds) diminished the negative sounds that came from nearby roads etc, and Krzywicka and Byrka (2017) saw that natural sounds evoke soft fascination. In other words, it is important to enhance natural sounds so that the visitors will have a good restorative experience and to get a better chance of getting the feeling of 'being away' from the city and one's daily stressors.



# Water

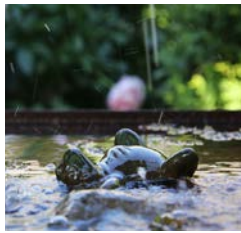


Figure 30. Photo: © Anna Bärge

Apart from its visual qualities, water is also preferred for the sounds it can make. Pescardt (2014) is in her PSD 'serene' arguing for the importance of there not being any noise from traffic and that it should be calm and silent for a pocket park to be good for restoration. This can be hard to achieve in a pocket park that is located in a busy urban environment. It will be hard to "take away" all the noise from a city but I do think it is possible to diminish the noise from the city with help of natural sounds and it has been shown in different research that the sound of water can do that (O'Brien, 2014; Cérwen et al., 2016). The sound of water is as well highly valued (Völker & Kristemann, 2011; Yang & Kang, 2007) and it has a relaxing effect on us (White et al., 2010). Yang and Kang (2007) are arguing that it is important that the sound level of the water should not constantly be the same, that it should vary. If one do as Schafer (1994) is talking about in his book, to use different materials that water can interact with to create different sounds (see Figure 30-33), this will lead to a variation in the sound level.

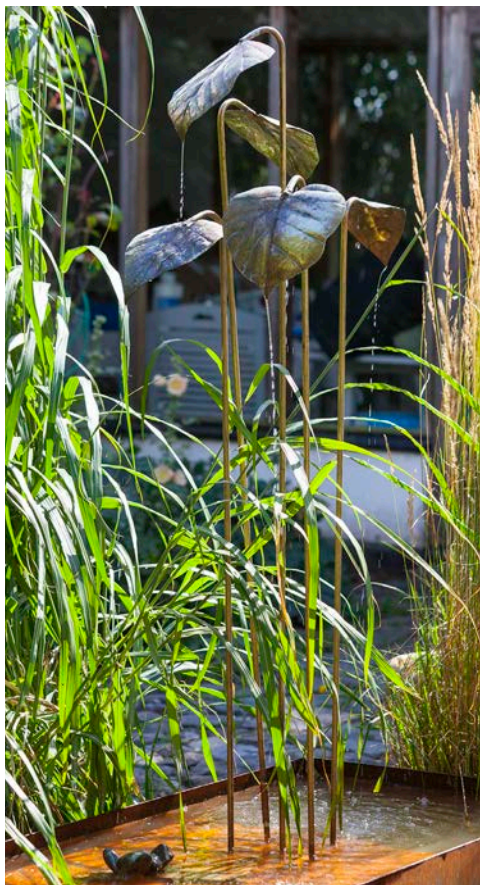


Figure 31. Water interacting with metals.  
Photo: © Anna Bärge



Figure 32. Running water. Photo: © Anna Bärge



Figure 33. Water interacting with granite.  
Photo: © Anna Bärge

## Wildlife



Figure 34. Black bird taking a bath. Photo: HelgaKa

**T**he restorative effect of a park gets better according to Irvine et al.'s study (2006), if there are more natural sounds. Irvine et al. explains that this can be achieved if the biodiversity is better which will lead to a more diverse wildlife. This is as well comparable to Pescardt's PSD 'rich in species'. She is arguing that a rich variation in plant and animal species are important for restoration.

By planting a high number of different plant species that flower during different periods to achieve a long flowering season one will not only make something beautiful to look at and something that will intrigue fascination, one will as well make the area a good place for animals and insects (see Figure 35-37). Water is something that will attract animals and insects as well and one can use bushes that grows tight to create places for birds to be without being disturbed. Use plant species that animals and insects are attracted to and hopefully this will make them use the park and live there. I think that the sound that will be created by the wildlife (see Figure 34 and 36) will help to diminish the noise from the city and will help the visitor to get a feeling of 'being away'.



Figure 35. A bumblebee. Photo: © Anna Bärge



Figure 36. Bird singing. Photo: Allan Drewitt

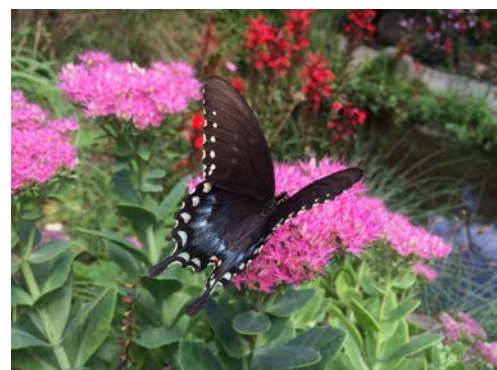


Figure 37. A butterfly. Photo: © Anna Bärge



# Wind



Figure 38. *Miscanthus sinensis* 'Sarabande'. Photo: © Anna Bärge

**W**ind will not only provide for sound but it can as well make interesting patterns on the ground when the leaves and branches are moving because of it. It is not only trees that can be interesting in the wind. For example different kind of tall grass species (see Figure 38 and 40), taller flowers and bushes can create interesting patterns and sounds as well.

During the warmer seasons when the plants have foliage one will be able to hear the wind in the leaves. To create this during the colder seasons one can use plants that keep their foliage, winter green or for example *Carpinus betulus* that keeps its dry leaves during the winter months (see Figure 39).



Figure 39. *Carpinus betulus*. Photo: © Anna Bärge



Figure 40. *Calamagrostis x acutiflora* 'Karl Foerster' Photo: © Anna Bärge



# Paths

A stressed individual will not always like to have interactions with other people and Cérwen et al. (2016) could see that their stressed participants highly valued the paths with gravel. Those paths made it possible for them to be aware of what was going on in the surrounding. This can be comparable to Ulrich's (1983) quality 'ground texture', ART's 'fascination' and Prospect and refuge, the ability to move around without fear, for one to feel safe.



Figure 41. Path with gravel.  
Photo: © Anna Bär



Figure 42. Path with wooden chips.  
Photo: © Anna Bär



Figure 43. Clear entrance to park.  
Photo: © Anna Bär

It is important that a park in an urban environment is available for everyone so it is of much importance that paths that are made out of gravel are made so that one with for example a wheelchair can use them without any problems (see Figure 41).

Cérwen et al. (2016) could as well see that using softer materials on paths (such as wooden chips) slowed down people's walking speed. I think that this would not only be good to help an individual to slow down from their normally busy day but it would as well make the park more interesting and that it would elicit fascination (see Figure 42).

I think the sound of the paths will as well help a visitor to get a feeling of 'being away', to hear and see clearly that one is entering a new space (see Figure 43).

As mentioned before: *"If I can hear my footsteps as I walk, I know I am in an ecological environment."* (Schafer, 1994, p. 213).



# People



*Figure 44. Lawns have more seats than fixed benches. Photo: Dan Cipolla*

In Peschardt's study (2014) the PSD's 'social' was highly valued. She has written under that dimension that for example "plenty of people" is preferable. Grahn and Stigsdotter (2010) as well as Nordh et al. (2011) saw that plenty of people was not preferable when it comes to reducing stress. I would say that hearing that one is not alone would make one feel safer, and by having different rooms with different characters and sizes one can choose to be around other people or not. People don't necessarily have to be a negative thing (see Figure 44).

# SPACE/SPACIALITY

**S**pace and spacialty has big affect on how people interpret a place. I therefore think it is important to work with these different aspects that I will be explaining in the following sections.

## Enclosure

**P**atherick (2000) and Gatersleben and Andrews (2013) did research where they tested the Prospect and Refuge theory. Both these studies came to the answers that if the area was high in refuge (enclosure), then it was experienced as less restorative because the participants felt less safe.

Perscardt (2014), Nordh and Østby (2013) and Kaplan et al. (1998) all are saying that a pocket park that doesn't have a good cover from the urban environment that surrounds the park are less restorative. They are all saying that that a pocket park needs to have good enclosure, good cover from the surroundings, for it to give the visitor the feeling of being away, and for the visitor to forget that one is in an urban environment. In other words, will give the visitor a restorative experience.

I think there is a fine balance between it being too enclosed and too open to the surroundings but I do think that it is important that the park has a clear border/walls/edges (see Figure 10-11, p. 50) that enclose the park and shields it from the surrounding. This will help to give the visitor a restorative experience because the visitor will not get distracted by the busy urban surrounding and it will separate the visitor from surroundings. Then within the park I think there should be different types of enclosedness, different degrees of it (see Figure 45-47, p.64), for people to be able to choose where they want to be, and by using some plants that grow more dense and some that grows less dense can have an impact on how enclosed a park feels.



## Different rooms



Figure 45. Photo: Ruth Hartnup

multiple purposes so that people's spatial behavior can shift and so that people can be able to be in different distances to other people. This I would say is the same when it comes to public green areas, such as a pocket park. Altman and Vinsel (1977) saw that people use different distances to the person they are interacting with depending on if they are for example sitting down or standing up. This indicates that it is important to have different rooms where different kinds of interaction can take place, from being alone to interacting with a group of people.

For example a savannah inspired area, a lawn with scattered single trees or group of trees (Ulrich, 1983). Here one can choose to be alone or be with a group of people (see Figure 45).

Or smaller rooms where the social distance is smaller and more intimate (see Figure 46 and 47).



Figure 46. Photo: La Citta Vita



Figure 47. Photo: © Anna Bärq

## Seating arrangements

In the earlier part, p. 28, I mention how people use different distances when they are interacting with other people depending on if they are standing up and sitting down. The distance between people who are interacting with each other will as well differ depending on if they know each other or not and how well they know each other. So different kinds of seating arrangements in a park are important. There should be possibilities to sit with a group of people and there should be possibilities to sit by yourself.



Figure 48. Bench with the back protected.  
Photo: © Anna Bärq



Figure 49. Seating arrangement for several people.  
Photo: Susanne Nilsson



Figure 50. Sketch of a "berså".  
© Anna Bärq

Having a bench with the back protected and a view over some parts of the park will make the visitor feel safe (Prospect and refuge), "to see without without being seen" (see Figure 48).

For groups of friends who are meeting up there could be benches with tables as well as well kept lawns that can be used for a multitude of social interactions (see Figure 44 and 49). These kind of seating arrangements will give people the possibilities to choose what distance they think is a good distance to other people.

One way could be having a "berså", an enclosed smaller area. A "berså" will create some privacy for those who want (see Figure 50). However, it is important that it is not too dense and dark so that people doesn't feel safe when being there, there should be a good balance of Prospect and refuge. To make the visitor feel more safe one can have gravel paths around the "berså" so that the person using it can hear if someone is coming or not.

## The experience of size

**D**ue to pocket parks limitation in size, I think that giving the impression that the park is bigger than it actually is will help the visitors to get the feeling of being away. I am mentioning under section 'Visual' that one can make a visitor get a feeling that the park is bigger with the help of depth/perspective (p. 51) and deflected vistas (p.49). Kaplan et al. (1998) explain how paths that are circuit will give the expression of that the park is bigger. The circuit paths will not only make the park feel bigger, it will as well give the visitor secondary prospect, people will get fascinated and get curious. The visitor will get the feeling of that there is more to see and this will in turn give the visitor an opportunity to get the feeling of extent.

I am, under section 'Visual' talking about using for example tree canopies as a roof (p.53) to create an enclosure and how tall buildings that are near a pocket park can make the park feel smaller. Some kind of green roof in some areas will not only enhance the enclosure but it will as well make the park feel bigger and it will separate the visitor from the urban environment even more.



## Crowding

**A**s I mentioned earlier (p.62), lots of people does not necessarily have to be a bad thing. I do think though that crowding can have a negative effect on people's ability for restoration. Earlier in this thesis am I talking about how it is important for an individual to for example hear what is going on around them, that a stressed individual prefers knowing if someone is coming towards them so that they can choose to interact with the other person or not. So from the information I have gathered during this study and from personal experience I do think that crowding has a negative effect on restoration. It is hard to control how many people will visit a park. I do think however that by dividing the park into different rooms with different sizes, smaller rooms for people who want to be alone (see Figure 46 and 47 on p.64, and 50 on p.65) and bigger rooms for people who want to interact with other people (see Figure 44 on p.62 and 45 on p.64), can help with reducing the feeling of crowding. By using the information from research on Personal space (pp. 26-28) one can get an understanding of different sizes of space people generally prefer depending on what they are doing, what distances that are normally socially accepted.



# DISCUSSION

I will in this part discuss the result of my literature study and I will answer my two other research questions.

Can small green spaces provide health benefits at a similar degree as other green areas have shown to do?

We live today in an era of distraction. There are constant inputs, stimuli and information for our brain to take care of. One could say that people are living in a city with sounds that are discordant, they are living in cacophony.

It is not only the constant information and the noise that makes people stressed. People are having higher expectations on themselves, higher expectations at work, and we are in Sweden getting more immigrants that have been going through some really tough times that have affected them and they have stress of adjusting to a new country, a new culture and they have to learn a new language.

A lot of cities around the world are today going through densification. When cities densify the population grows which can risk also making the city more impersonal, and I think that smaller green areas that are spread out in the urban environment with some kind of connections to each other can increase the curiosity and satisfaction to make the city more personal.

The World Health Organization (2013) states that people living in a city should not have more than 300 m to the nearest public space (e.g. park, square etc.). Grahn and Stigsdotter (2003) saw during their research that if a park is too far away from people's homes it is much less used and if a park was close to their homes it was used more frequently. I think that these results argues well for the importance of having green areas close to where people live, large as well as smaller areas. By having more smaller green areas in an urban environment it will make people feel more satisfied with the neighbourhood, more people will have a green view from their windows, there will be a greener view on peoples route to and from work, and this has been shown to have a great impact on peoples well-being (Kaplan et al., 1998; Kaplan, 2001; Grahn & Stigsdotter, 2003; Peschardt, 2014).

People being satisfied and happy in their neighbourhood, I would say, will generate happier people which I think will have a long term effect on people's mental health.

One of my questions in this thesis was if smaller green spaces can provide health benefits?

Nordh et al. (2009) and Nordh and Østby (2013) could see during their research that a pocket park in an urban environment can be as restorative as a larger park if it has the same components as a larger park. These results are important. They show that pocket parks are important for making the urban environment nicer to live in, they can improve peoples health and they make a city that is going through densification feel less dense. Although I do think that the size of pocket parks can have a negative effect on the possibilities for restoration, but if the park is well designed, it has some of the components I have brought up in this thesis (e.g. depth, a clear entrance, focal point, enclosure etc.) then I think that pocket parks can make a big difference in an urban environment. Having more pocket parks in an urban environment will not only give people places for restoration, it will as well give more people a green view, from their homes, from their work and on their way to and from work.

The fact that more and more people are suffering from stress in today's society is a problem and it costs the countries more and more money. Having more green areas that are spread out and closer to each other in urban environments will give people a better access to places where they can wind down and find restoration. This can help people get a better health, lower their stress levels, people will be happier, and this can be a long term solution for reducing the stress levels and lower the percentage of the population who is suffering from mental illness.

The statistics are showing that more and more people are suffering from stress related illnesses in Sweden and the government needs to start working with the reason why people gets stressed to prevent it and not only treat stressed individuals when it already has happened. The different theories and the research I have brought up in this thesis all shows that green environments are important for people's well-being and more green environments in the urban environments, small and big, can help with reducing the risk of people getting stress related illnesses. I think Kaplan et al. (1998) simple words explain well that small efforts make a difference: "A few canopy trees can provide separation from an urban environment as well as restorative natural setting."

Will the amount of people who use the park be a problem? Research has shown and the theories are arguing that crowding is not good for restoration. A pocket park can be quite small and crowding could be a problem. Maybe if the park has different rooms that have different

characters and that are in different sizes the possibilities to control the feeling of crowding can be increased. A person could still go to a place where they can be by themselves, for example a "berså", if the park has different rooms and that could help with crowding.

Can one say that everybody benefits from the same kind of environments? Do we want and need the same kind of environments? What kind of environment different people wants and needs can differ quite a lot and can depend on different reasons. That can for example depend on one's background, one's culture, what one is used to etc. This can make it hard to design a park that is suitable for everybody's needs and preference. However, parks are normally appreciated by most people so it is not impossible, and by having different rooms and different characters in a park more people will find a place that suits them and their needs for that day. The different theories and research that I am discussing in this thesis deal with many similar things that help people to reduce their stress levels. This I think is, as Ulrich argues, because of our biological factor. That we all have some preference to a certain type of environment that is connected to our early ancestors and our evolution.

Something I think is important to remember is that a green environment is constantly going through changes. This could be the seasons, the plants getting older and bigger, some might die and get replaced etc., and this can be something a designer can work with and make this interesting and beautiful and work with nature's processes, as an element in the park. A park might not only go through natural changes. Maybe the park is not being used as the council and the designer was planning and hoping for. Then it is important to look at why this is and work with improving the park so it fits with people's needs and wishes.

One thing that will be hard for a designer when designing a pocket park, where the main activity is restoration, is how much is enough? Berlyne (1960;1966) states that our arousal level needs a balance between different characteristics that increase and decrease it for it to be on a good level. What is a good balance and mixture of these different characteristics and how much is too much? Kaplan and Kaplan (1989) are talking about the importance of curiosity and exploring, which for me can be connected to novelty that according to Berlyne increases our arousal level. A stressed individual, as I have understood it and through my own experience, will be in a need of an environment that is quite calm, that isn't too unpredictable and that doesn't have too many impressions. I do believe however that curiosity, exploring, novelty, impressions etc. are good and beneficial for stressed individuals in the right amount. So for a designer to understand what is the suitable level of these characteristics I would say the designer has to visit

many pocket parks, look at what people prefer, what they use (stressed and not stressed individuals) and talk to people. Another characteristic that can be hard to get a good level on is enclosure. I have earlier in this thesis said that I believe that the feeling of being away is very important for the visitor to experience good restoration. I do as well believe that enclosure, to some degree, together with natural sounds that disguise the noise from the urban environment are important for an individual to have that feeling. The question is however, how much enclosure is good and how much is too much? What feels like a safe place and what feels unsafe? I think here again that for a designer to get an understanding about that, one needs to visit many pocket parks. What is preferred both by stressed and not stressed individuals? What is it that make people visit a park and what is it that prevents people for visiting it? Having green environments near a person's home make the person more satisfied with the neighbourhood (Kaplan et al. 1998; Kaplan 2001), and people mostly visits pocket parks to an from home/work (Peschardt et al., 2012; Perschardt, 2014). If a pocket park is a person's closest park, there may be social aspects, the person being happy in the neighbourhood and place attachment that as well will create security, the feeling of being safe.

Urban environments are built on a grid system, straight lines where the speed of traffic and people is fast. Pocket parks in urban environments will be an oasis that is very much needed so that one can get a break from the busy streets and the pocket parks will break the grid system of the city, which is as well very much needed. Pocket parks in urban environments will give people a direct experience of green environments as well as it can be viewed and appreciated from a distance.

## HOW WILL IT BE IN THE FUTURE?



*Figure 51. People using their cellphones in a park. Photo: Mable Amber*

**M**ost of the research I have read have showed their participants photos of different kinds of green environments which they had to evaluate and say what they thought was restorative and not. The participants were not actually out experiencing nature. Does looking at photographs give the same results as if the participants were spending some time in nature? Doesn't the surrounding affect how we interpret a place? One doesn't get a full understanding about the whole area when one is just looking at photographs. I think that spending time in nature and to get an experience of the whole area will give a person a different reaction to the place compared to if one is just seeing photographs of it. Looking at photos does not, for example, give one an experience of the sounds that are around and in the park. I would say that a pocket park where one only hears the noise from the city does not have the same restorative effect as a pocket park has where one can hear natural sounds, such as the sound of water, the sound of the wind in the trees or the sound of birds and insects.

To reach my result (my guidelines) I did a literature study. I wonder if the result of my literature study would have been the same if the participants in many of the research I studied had actually been out in nature instead of looking at photographs? I think that this is a limitation in the research that is available. Most of the articles were written

by the same authors with similar research, and this I think is a limitation as well. The fact that much of the existing research has similar results shows clearly how important green environments is for us and how much it effects us in a positive way.

My choice of method might not have been the best way of reaching my results, for me to be as objective as possible because of limitations in the research that is available. If I was going to do this again, I would have gone out and visited many different pocket parks and talked to people using them to get my own experience and knowledge of what works and what doesn't, what is preferred by the public and what is not. Then with the knowledge I got from the visits and interviews together with the knowledge from the theories and existing research, I would have created guidelines of tangible elements that would work in a pocket park.

Kaplan and Kaplan (1989) argue that the feeling of being away is very important for one to be able to get a restorative experience, and I agree with them. When changing the environment one is in, one will give oneself a better chance to get to the feeling of being away, a chance to daydream and to "forget" one's everyday stressors.

Our society is getting more and more digitalized and will people seek restoration in for example their cellphones in the future instead of actually going outside (see Figure 51)? Will people look at photographs, like in some of the studies, instead of experience nature when they want to relax and "get away"? A question that I have been thinking about during this study is if the theories will be relevant in a few years time due to the digitalization of society? This is a very hard question to answer and I do really hope this is not going to be the case. In particular, the digitalized nature of society may lead to sedentary behaviour, which is not good for our health. I do think that people are seeking more green environments and that they are seeking back to how we used to live. It is becoming more popular to grow your own food and people are getting more aware of the importance of green environments and nature due to global warming. Kjellgren and Buhrkall (2010) did see during their research that looking at nature on a video did not have the same positive result as if one would spend time in nature. This shows that we humans need green environments even though the societies around the world are getting more digitalized.

The theories I have brought up in this thesis are based on an interaction between people and the environment that doesn't really exist today. People are having their attention somewhere else, not on what is happening around them. Lazarus and Cohen (1977) explains that we react like this, that we turn off and we are not being aware on what happens around us, that we disengage to protect ourselves because of the constant information our brains has to take care of in urban settings that are crowded. Lazarus and Cohen were talking about this



already in 1977, we are now living in year 2019. Have we become even more disengaged? The smartphones we have today I think have made us more self-centered and disengaged. Adding more green environments in urban environments, such as pocket parks, will give people a green environment that is more accessible and this will hopefully lead to it being more used and people feeling how much good green environments do for us and our health. For this to be possible, smaller green environments need to be made more attractive (as shown p. 15), so that they can withstand "exploitation pressure". Smaller green spaces in an urban environment should complete the larger green spaces. The smaller green areas can thereby have alternative functions that we require on a daily or more frequent basis, closer to home, whilst the larger parks can then be visited as more of a 'destination'.

The smaller green spaces in urban environments need to be protected and taken care of as they are an invaluable asset for any city. The perception that small green spaces have less value and therefore are too often used to increase building densification is limited and short term. Densification will lead to more people per m<sup>2</sup> and so the need for green spaces, regardless of size is greater than ever. Green areas must be part of the bigger picture of densification so that everybody has close access to some kind of green space, small or big.

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## PHOTOS

All photos are allowed to be used for publication.

**Figure 1:** Google maps of Gärdet. Accessible at: <https://www.google.com/maps/@59.346519,18.1050634,964m/data=!3m1!1e3> [2019-02-22]

**Figure 2:** Photographer, Henrik Ahlen. Accessible at: <https://www.flickr.com/photos/henrikahlen/2481110496/in/photolist-4MfkHb-eoCisn-fnX-MMY-epyxpg-cbm3Py-bCnDDt-hewhcY-appWUD-8ctUKu-79xy-Ja-izyGJ-8oDFQb-bVZWMA-eoCiMe-89x21V-pbikGr-3m9GkC-4Jb-NuZ-epyx7f-8oAuoV-69AQvH-epyx5U-8oDFM9-BuZi-cHMEqm-8oAs-JD-4LrZ9E-tufVM-hR7VU-4MbahM-5VkSYa-8oAu7x-8oDCsU-epyxef-8oDCXq-6zAvUR-uJebi-wHr1-4LrYPJ-cPBe4j-oC8j9B-JpCi9c-7zjGc2-azYQwL-26daZxg-na3ReU-8oDDwE-YLDsi7-4LnLKV-8oDEz7> [2019-02-21]

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